UNEP

CBD

CONVENTION ON BIOLOGICAL DIVERSITY

Distr.
GENERAL

UNEP/CBD/WG8J/3/INF/4
8 September 2003

ENGLISH ONLY

AD HOC OPEN-ENDED INTER-SESSIONAL WORKING GROUP ON ARTICLE 8(j) AND RELATED PROVISIONS OF THE CONVENTION ON BIOLOGICAL DIVERSITY
Third meeting
Montreal, 8-12 December 2003
Item 4 of the provisional agenda*

COMPOSITE REPORT ON THE STATUS AND TRENDS REGARDING THE KNOWLEDGE, INNOVATIONS AND PRACTICES OF INDIGENOUS AND LOCAL COMMUNITIES

Regional report: Australia, Asia and the Middle East

Note by the Executive Secretary

1. The Executive Secretary is circulating herewith, for the information of participants in the third meeting of the Ad Hoc Open-ended International Working Group on Article 8(j) and Related Provisions, the regional report for Australia, Asia and the Middle East on the status and trends regarding the knowledge, innovations and practices of indigenous and local communities, which was used as input to the first phase of the composite report on the same subject (UNEP/CBD/WG8J/INF/1).

2. The report is being circulated in the form and language in which it was received by the Secretariat.

* UNEP/CBD/WG8J/3/1.

/…

/...

TRADITIONAL LIFESTYLES AND BIODIVERSITY USE

REGIONAL REPORT: AUSTRALIA, ASIA AND THE MIDDLE EAST

Composite Report on the Status and Trends Regarding the Knowledge, Innovations and Practices of Indigenous and Local Communities Relevant to the Conservation and Sustainable Use of Biodiversity

Prepared for the Secretariat of the Convention on Biological Diversity
by

Marcia Langton and Zane Ma Rhea

with
Margaret Ayre and Juanita Pope

2003

Acknowledgements

The authors wish to acknowledge Margaret Ayre and Juanita Pope for their significant research contributions to the collection and collation of information for this report. We also wish to acknowledge the generous contributions of reports and information sent to us by Maurizio Farhan Ferrari and Ranjay K. Singh. We would also like to thank all the respondents to the questionnaire. Finally, we acknowledge Henrietta Marrie and her team for their generous assistance.

Marcia Langton and Zane Ma Rhea

Melbourne, 2003

1 State of Retention of Traditional Biodiversity Related Knowledge

1.0 Overview

1.0.1 Framing Introduction to Part I

Part I of this Report provides an introduction to the state of retention of traditional biodiversity-related knowledge in Australia, Asia, and the Middle East. Examples are provided from a much larger sample considered during the research phase of this Report to enable a discussion of the state of retention of traditional biodiversity-related knowledge and practices.

There is a number of direct and indirect indicators from which can be inferred the existence of traditional biodiversity-related knowledge and practice. Firstly, indigenous people, nations and international bodies all attest to the existence of such knowledge and practice, and where there is concurrence in relation to particular peoples and places, it can be assumed that systems of traditional knowledge and practice continue to be used. Most significantly for the Convention on Biological Diversity (CBD), the examples and case studies provided in this Report provide an indication of both the extent of nation state recognition of the traditional biodiversity-related knowledge and practice of indigenous peoples and local communities, as well as Non-Government Organisation (NGO) recognition. To some extent, it is necessary to infer the existence of traditional biodiversity-related knowledge and practices from the ethnographic, demographic and other literature, despite the fact that such knowledge and practices may not have been documented.

Indirect reference to these bodies of traditional biodiversity-related knowledge and practice are shown to exist in discussion, for example, of subsistence living, language diversity, religious belief systems, and traditional medicinal knowledge.

There is also a number of direct and indirect indicators from which can be inferred threats to the existence of traditional biodiversity-related knowledge and practice. Nation states in the preparation of their National Biodiversity Strategy and Action Plans (NBSAPs) referred, in many cases, to such threats, as do NGO and international agency documents concerning projects to support traditional life ways, and hence their bodies of traditional knowledge. Such indicators of threat are deforestation and other biodiversity loss, language loss, biodiversity and social destruction following military and civil conflicts, loss of territory and inappropriate land tenure arrangements for local and indigenous communities. In addition, the First and Second National Reports under the CBD referred consistently lack of adequate funding to document and support the retention of traditional biodiversity-related knowledge and practices.

For example, in its Second National Report, China (2001: 45) reports in relation to (4.) ‘Problems encountered in the maintenance and use of traditional knowledge’, that:

> Although some progress has been made in the conservation of traditional knowledge in China, the traditional knowledge, innovations and practices are scattered greatly among local people and have not been better summed up. Along with the process of modernization, the eminent national traditional cultures are dying away gradually. There is inadequate awareness on the conservation of traditional knowledge, and the national policies, strategies and legislation in this field are still very weak. The mechanism of equitable sharing of benefits from the utilization of traditional knowledge, innovations and practices has not been established. The national capacity and technologies for conservation of traditional knowledge are still weak.

China reported that 'the resources available for meeting the obligations and recommendations made on this Article are limited due to the lack of policies and mechanism for sharing the benefits from the traditional knowledge, innovations and practices as well as the limitation of the financial capacity of the country' (2001: 40). Nevertheless, the Chinese government acknowledges and protects traditional knowledge systems by providing financial support to the programme of work to a limited extent.

Traditional and indigenous knowledge systems related to biodiversity conservation are fundamental to human life throughout much of the Asia, the Middle East and Australia, especially in rural and remote areas, and they play a much larger role in economically developing countries than in developed nations such as, for instance, Australia, Singapore and Japan. This is because of the high dependence of human populations in most of the nations covered by this Report on traditional food production and other activities for providing basic needs. As a result, the value of traditional and indigenous knowledge systems to the economies of those countries where this is the case is incalculable. Ferrari (n.d., unpubl. msc.) suggests that, although limited natural resources are found in urban environments, most biological diversity is by far found in rural areas. Quoting ASEAN (2001) figures, he points out that 'It could be therefore tempting to associate the term 'local communities' with people living in rural areas, mostly consisting of farmers and fishers. Southeast Asia has a population of about 526 million 330 million of whom (about 63%) live in rural areas'

1.0.2 Definitions of indigenous peoples and local communities

1.0.2.1 Who are the indigenous peoples of these regions?

Ferrari (n.d., unpubl. msc.) like many others observes that defining indigenous Peoples is a contested and controversial matter, and that a definition of local communities can only be developed to fit a particular research purpose. He points out that related population numbers can only be approximated. An excerpt from his paper discussing this problem for the South-East Asia region is included here:

> The term 'indigenous peoples ' is controversial in the region, as it is in the rest of Asia.

> Considering that in its most literal sense the term only implies long term residence in a given area, some Southeast Asian governments (following the lead by China and India) have argued that the term cannot properly be applied to their countries given that the their majority populations can be considered 'indigenous' in that sense. They therefore assert that this term should only apply to the original inhabitants of countries which have been colonised by settler populations (such as in the Americas and Australasia).

In the international debate on indigenous peoples since the 1970s, however, the term has clearly taken a trajectory whereby it has come to be applied to territorially-based ethnic groups that are culturally distinct from the majority populations of the nation states in which they now find themselves, that are politically marginalised, and who think of, and identify themselves as 'indigenous' (Simpson, 1997). The United Nations' Working Group on indigenous Populations has been using the following working definition (proposed by UN Special Rapporteur Martinez Cobo in 1986) to guide its work:

> Indigenous communities, peoples and nations are those which, having a historical continuity with pre-invasion and pre-colonial societies that developed on their territories, consider themselves distinct from other sectors of the societies now prevailing in those territories, or parts of them. They form at present non-dominant sectors of society and are determined to preserve, develop and transmit to future generations their ancestral territories, and their ethnic identity; as the basis of their continued existence as peoples, in accordance with their own cultural patterns, social institutions and legal systems (Cobo, 1986).

Summing up the deliberations of years of work, 10 years later, Mrs Erica Daes (1996), the Chairperson of the UN's Working Group concluded that:

> In summary, the factors which modern international organisations and legal experts (including indigenous legal experts and members of the academic family) have considered relevant to understanding the concept of 'indigenous' include:
>
> - priority in time with respect the occupation and use of a specific territory;
> - the voluntary perpetuation of cultural distinctiveness, which may include aspects of language, social organisation, religion and spiritual values, modes of production, laws and institutions;
> - self-identification, as well as recognition by other groups, or by State authorities, as a distinct collectivity; and
> - an experience of subjugation, exclusion or discrimination, whether or not these conditions persist.

The International Labour Organization's Convention No.169 of 1989 adopted a definition less concerned with historical continuity with pre-colonial societies and deals with both indigenous and Tribal Peoples, clearly establishing its applicability to all regions of the world (Kingsbury, 1998). Its Article No.1

stipulates that it applies to: (a) tribal peoples in independent countries whose social, cultural and economic conditions distinguish them from other sections of the national community, and whose status is regulated wholly or partially by their own customs or traditions or by special laws or regulations;(b) peoples in independent countries who are regarded as indigenous on account of their descent from the populations which inhabited the country, or a geographical region to which the country belongs, at the time of conquest or colonisation or the establishment of present state boundaries and who, irrespective of their legal status, retain some or all of their own social, economic, cultural and political institutions. ILO Convention 169 further stipulates (Article 1(2)) that 'Self –identification as indigenous or tribal shall be regarded as a fundamental criterion for determining the groups to which the provisions of this Convention apply' (ILO Convention No. 169, June 27, 1989).

The World Bank developed a functional definition dropping reference to the historical continuity and colonialism, treating as indigenous Peoples those ‘social groups with a social and cultural identity distinct from the dominant society, which makes them vulnerable to being disadvantaged in the development process’ (World Bank Operational Directive 4.20).

According to these more recent interpretations of the term, the indigenous peoples of the regions covered by this Report become easier to identify and include all or part of those groups that are officially distinguished from the society of the national majority, such as the 'indigenous cultural communities' of the Philippines, the 'hill tribes' of Thailand, the 'isolated and alien peoples' of Indonesia, the 'aborigines' of Malaysia, the 'natives' of Malaysian Borneo and possibly several ethnic groups of Burma/Myanmar, Laos, Cambodia and Vietnam (Colchester, 1995).

Definitions and applicability are important matters given the nature of rights accorded to indigenous peoples by international law due to their distinctive identities, their deep links with their ancestral lands, and their reliance on customary law and institutions (which in many cases are deeply interrelated with their surrounding natural environment), which precede the creation of nation states. Among the most relevant to the biodiversity debate are the rights to:

- own, control and manage their traditional territories, lands and resources;
- self-determination, representation and full participation in decision-making;
- use and protect their languages, culture and respect for their religious belief systems;
- health and a healthy environment;
- prior informed consent on all matters related to development; and conservation that may affect them; and
- control their economic, social and cultural development.

The Philippines has already legally recognised the rights of indigenous peoples in national legislation. Their indigenous Peoples Rights Act of 1997 refers to indigenous Cultural Communities (ICCs) and

indigenous People (IPs) as:

> …a group of people or homogenous societies identified by self-ascription and ascription by others, who have continuously lived as organized community on communally-bounded and defined territory, and who have, under claims of ownership since time immemorial, occupied, possessed and utilized such territories, sharing common bonds of language, customs, traditions and other cultural traits, or who have, through resistance to political, social and cultural inroads of colonization, non-indigenous religions and cultures, became historically differentiated from the majority of Filipinos. ICCs/IPs shall likewise include peoples who are regarded as indigenous on accounts of their descent from the populations which inhabited the country, at the time of conquest or colonization, or at the time of inroads of non-indigenous religions and cultures, or the establishment of present state boundaries, who retain some or all of their own social, economic, cultural and political institutions, but who may have been displaced from their traditional domains or who may have resettled outside their ancestral domains (S. R. C. S. (1997) indigenous People Rights Act of 1997, R.A. No.8371).

One of the principles in international law concerning indigenous peoples is that of self-identification, and several ethnic groups in several Southeast Asian countries have self-identified as indigenous Peoples in a statement made in 1991 to the UN Working Group on indigenous Populations in the name of 13 Asian indigenous organisations and networks (eight of them Southeast Asian) saying:

> …We urgently request that people who are denied the rights to govern themselves, and are called tribal and/or aboriginal in our region, be recognized, for the purpose of this Declaration and in accordance with ILO practice, as equivalent to indigenous peoples' (Cited in Kingsbury, 1998).

Concerning numbers, the International Work Group on indigenous Affairs in 1996 published the following table summarising existing estimates of indigenous numbers in various Southeast Asian countries.

Country	Total Number (millions)	% of population	Number of ethnic groups
Burma	**11**	**30**	**60**
Cambodia	**0**	**1**	**-**
Indonesia	**3**	**1.5**	**300**

Country	Total Number (millions)	% of population	Number of ethnic groups
Lao PDR	**0.8**	**23**	**67**
Malaysia	**2**	**11.1**	**71**
Philippines	**6.5**	**16**	**50**
Thailand	**0.5**	**1**	**23**
Viet Nam	**9**	**13**	**54**

Table 1: Some Basic Data on Indigenous Peoples in Selected Asian Countries (Erni 1996:20 cited in Ferrari n.d. unpubl. msc.*)*

Many of these figures, however, are considered unreliable as they are based on government definitions of marginalised groups. As Colchester explains, 'In Indonesia the government policy recognises a class of peoples, officially referred to as 'suku suku terasing' or 'masyarakat terasing' (isolated and alien tribes/peoples), as requiring special attention in development' Government estimates put their numbers at around 1.3 millions (Colchester, 1986). 'However, a civil society movement of self-identified 'indigenous Peoples' formed in 1999, who refer to themselves as '*masyarakat adat'* (peoples governed by custom). As Ferrari explains, the 1999 General Statement from the First Congress of the Indigenous Peoples of the Archipelago (AMAN), stated that the indigenous peoples are 'communities who for generations base their lives on origin in a certain customary area, who have sovereignty over land and resources, whose socio-cultural lives are governed by customary laws and institutions, which regulate the communities' lives' (from Sombolinggi questionnaire 2002 cited in Ferrari, n.d. unpubl. msc.) and this definition embraces a far wider set of peoples, who are 'guesstimated' to number as many as 65 millions (Colchester 2000).

This Report uses the phrase 'indigenous people', while acknowledging that some nation states in the regions covered by this Report contest the use of this descriptor.

1.0.2.2 Local communities

Because the widespread use, mainly in rural areas, of traditional and indigenous biodiversity related knowledge in agriculture, food harvesting and related purposes, and traditional medicine, as economic and subsistence activities, and because of the dependence on traditional and indigenous knowledge of a large proportion of the human population of the regions discussed in this Report, it is critical that an agreed definition of 'local communities' be established, taking note of the complex overlay discussed above with regard to the use of the phrase 'indigenous peoples'.

For the purposes of this Report, where appropriate the phrase 'indigenous peoples and local communities'

has been adopted.

1.0.3 A rapidly growing literature on traditional knowledge

'The nature of traditional knowledge is such that more of it is transmitted orally than written down,' as Posey (1996:81) observe. Part I of this Report, then, relies, on a variety of accessible literature documenting or analysing oral descriptions of knowledge, innovations and practices of indigenous peoples and local communities relevant to the conservation and sustainable use of biodiversity, in order to assess, and to provide indicators of, the state of retention of such knowledge and practices in the regions discussed in this Report.

This literature can be described as diverse, rapidly growing, and much of it is highly accessible as a result of digital libraries, people's biodiversity registers, inventories and web portals. In addition, experts and researchers from a wide range of sciences, including agricultural science, ethnobiology, ethnobotany and ethnoecology, the social sciences, and other fields, have also contributed to the recording of traditional biodiversity related knowledge. The role played by scientists, community practitioners, international and non-government agencies and governments, varies widely across the regions of this Report with the result that the literature has several identifiable sub-categories: scientific and technical literature; a body of social science, philosophical and theoretical literature; legal literature; the documents cataloguing developments among the international agencies which inform international norms, law and trade developments and national policy developments; national policy and program literature; and community practitioner literature.

By example, in Australia, from 1993 to 2000 the Northern Territory the Parks and Wildlife Commission's Ethnobotany Taskforce and Aboriginal traditional owners collaboratively researched and published the ethnobiology of 11 Aboriginal language groups and an Indonesian group. Traditional plant knowledge was promoted through the production of posters, identikits, larger thematic books and plant use walks; seven posters on plant use themes were produced; four identikits relating to wild food and medicine were produced; projects were initiated with 15 language groups; and a database was developed to store ethnobiological data (ANZECC 2001).

In China, the Centre for Biodiversity and Indigenous Knowledge is a government-supported NGO, operating mainly in southern China, which is taking the lead in promoting, investigating and applying traditional knowledge in biodiversity conservation and community-development. It has developed positive partnerships with the Yunnan Provincial Government and aims to foster networks between communities and other organisations (NGOs, grassroots organisations, research and educational institutions, etc) through actions such as the Congress on Cultures and Biodiversity (CUBIC 2000) that established the Yunnan Initiative, an important framework for strategic action on cultural and biodiversity

conservation.

The issue of the literature used in this survey is not merely a methodological one, but one that concerns the future retention of traditional environmental knowledge. As national education systems are extended to rural and remote populations, the documentation of this knowledge may be critical to the capacity of future generations of indigenous peoples and local communities to access that knowledge.

The population of the regions discussed in this Report constitutes more than half the world's population. It is therefore improbable that a study of this kind could represent the state of traditional knowledge and practice relevant to biodiversity conservation accurately in terms of the sheer volume of literature available, and unlikely that the subregions and areas within the subject regions could be represented in sufficient detail because many areas and populations have not been studied or have been the subject of little or no research of relevance to this study. The gaps in the literature can be attributed to the sheer size of the task of documenting the environmental knowledge of peoples who live in traditional subsistence economies, and to the lack of resources to do so throughout the developing world, amongst other factors. In the vast geographical areas of the regions discussed in this study, the importance of traditional knowledge to the natural resource management, agricultural and pastoral lifestyles, medicinal and other social and economic needs of most rural populations in these regions means that the task of documenting traditional knowledge and practices is unachievable in the short term, and will therefore be achieved incrementally.

A variety of contributing factors to the very large gaps in knowledge of, and literature concerning, traditional knowledge and practices relevant to biodiversity conservation require some attention in this Report.

These can be summarised under the following general descriptors:

- Underdevelopment and lack of resources to support measures to preserve and maintain traditional systems of knowledge of practice in relation to biodiversity conservation. Many Parties to the Convention referred to this problem in their First and Second Reports;
- War, civil unrest and destabilising political situations and events have mitigated against research and documentation projects in many areas, such as Afghanistan, Iraq, and North Korea, and reduce accessibility to information about local initiatives, if they indeed exist;
- Remoteness and inaccessibility of many small indigenous and local populations have mitigated against research and documentation undertakings, and reduce accessibility to information about local initiatives, if they exist;
- National legislation and policies relating to the identification (or non-identification) of indigenous peoples and local communities vary widely, so that some Parties to the Convention explicitly identify communities holding indigenous and traditional knowledge as a significant aspect of their capacity to respond to the requirements of the CBD, for example, Australia. Other nations having significant populations that retain

traditional knowledge and practices but do not recognize these distinct systems and subsume their interests and knowledge under the generic national interest; and

- The difficulty of identifying indigenous and local populations in areas of great ethnic diversity and antiquity, especially among those Parties that do not distinguish between ethnicity and indigeneity, and impose penalties on indigenous peoples and local communities seeking to differentiate themselves from normative and homogenizing national identities; and among those Parties that maintain excessive national identities against perceived external threats, and homogenise all ethnicity as citizenship of a unified state.

These problems pose limitations on the capacity to measure the state of retention of the traditional biodiversity related knowledge of indigenous peoples and local communities. Even where a Party has implemented legislation and other means to recognize and protect biodiversity at a very high standard, the absence of any recognition of indigenous and local populations means that it is impossible to identify any benefit to these populations, and raises the prospect that their knowledge systems, intellectual property and traditional practices may be jeopardized by nation-building.

There is an urgent need, for example, to document the knowledge of indigenous Arabs including the Bedouin. Their knowledge already generates a wide range of products and services that could contribute to the sustainable development of indigenous peoples and local communities in the arid lands of Arab countries. Currently, this includes products derived from bioprospecting such as colorants, oils, biochemical compounds, natural dyes and medicines; commodities including timber, handicrafts, nuts, fruits and perfumes. The services provided include ecotourism, watershed protection and carbon sequestering (Batanouny 2000). Nomadic peoples such as the Bedouin have maintained the biodiversity of natural systems through traditional governance structures and land use allocations. However, loss of territory and enforced sedentarisation have been key contributing factors to the loss of traditional knowledge among the Bedouin, for instance in Israel.

On the other hand, ‘Traditional and indigenous knowledge systems have also slowly been increasingly gaining recognition as providers of knowledge relevant to sustainable use’ (Ferrari, n.d. unpubl. msc.). Ferrari observes that since the 1980s, and increasingly during the past decade, some governments started to admit that they have not succeeded in sustainably managing natural resources (especially forests and coastal ecosystems) and that local communities and indigenous peoples need to become more involved in biodiversity management as they are the ones living closest to the resources that are supposed to be sustainably managed. The increasing conservation initiatives undertaken by indigenous peoples and local communities have also contributed to the retention of traditional biodiversity-related knowledge. Ferrari (n.d. unpubl. msc.) says:

> In several Southeast Asian countries, indigenous peoples and local communities have been taking active initiative in conserving and sustainably managing biodiversity, sometimes on

their own but often with the support of NGOs or as joint management with government departments, despite the lack of supporting legal instruments. There is a recent increasing trend in community conservation initiatives (the IUCN has recently coined the term 'community-conserved areas' CCAs the acronym which is used in this Report) and in community involvement in conservation initiatives initiated by NGOs or government agencies

Thus, the body of rapidly growing literature regarding traditional biodiversity related knowledge, while indicating that such knowledge is fundamental throughout these regions to the livelihoods of millions of people, provides evidence that its retention is jeopardised in many areas by a range of factors, including, to be discussed below, rapid economic development and reduction of the subsistence economies, loss of biodiversity as a result of over-exploitation, population shifts such as urbanisation, and military and civil conflict.

Paradoxically, documentation of traditional knowledge, especially of medicinal herbs, plants and animal products that are of interest to pharmaceutical companies and bioprospectors, can also place the integrity of that traditional knowledge at risk when the benefits of commercialization flow to external parties, on the basis of plundering the intellectual and natural wealth of indigenous and local peoples. Commercialisation of traditional biodiversity-related knowledge, while offering sorely needed economic opportunities to marginalized indigenous peoples and local communities, is attended by a variety of risks, some of which are discussed in Part II of the Report.

With the above discussions in mind, this Report will now survey indicators of both the existence of, and threats to, traditional knowledge related to biodiversity and practice.

1.0.4 Indicators of the existence of traditional biodiversity-related knowledge

To establish the state of the retention of traditional biodiversity related knowledge, it is first necessary to establish its existence and then to assess threats to which it is subjected. There are four indicators considered in this section to gauge the existence of traditional biodiversity related knowledge amongst indigenous peoples and local communities. These are: recognition of land and sea on which indigenous peoples and local communities rely for their cultural survival and subsistence; retention of traditional knowledge related to biodiversity throughout Asia and the Middle East—as indicated by the dependence of human populations on traditional knowledge and practice for subsistence; language diversity and the state of retention of biodiversity-related knowledge; and, religious beliefs and practices of indigenous and local peoples with relevance to biodiversity conservation. The recognition of traditional medicinal knowledge as an indicator of the existence of indigenous peoples' and local communities' traditional biodiversity related knowledge is discussed in section 1.3 below.

1.0.4.1 Recognition of land and sea on which indigenous peoples and local communities rely for their cultural survival and subsistence

Several countries in the region have only very recently set up a network of protected areas and others are in the process of expanding them. In the majority of countries, indigenous property and resource rights in protected areas are not recognised by the legal instruments of nation-states.

In India, the Government has taken steps to recognise indigenous rights through its forest policy for Northeast India. This Policy recognises plural ownership interests in forests and the accommodation of the rights and interests of indigenous people in biodiversity conservation planning.

In Australia, indigenous people have proprietary, social, cultural and economic interests in a proportion of the Australian terrestrial and marine environments. For example, around 15 per cent of the Australian landmass is held by indigenous peoples under a variety of land tenures. The maintenance of biological diversity on lands and waters over which Aboriginal and Torres Strait Islander peoples have title or in which they have an interest is a cornerstone of the wellbeing, identity, cultural heritage and economy of Aboriginal and Torres Strait Islander communities. Although Aboriginal and Torres Strait Islander peoples may be willing to share some of their cultural knowledge, aspects of that knowledge may be privileged and may not be available to the public domain. Traditional Aboriginal and Torres Strait Islander management practices have proved important for the maintenance of biological diversity.

1.0.4.2 Retention of traditional knowledge related to biodiversity throughout Asia and the Middle East—as indicated by the dependence of human populations on traditional knowledge and practice for subsistence

Part I of this Report notes the widespread use of traditional and indigenous knowledge throughout Asia and the Middle East in agriculture, food harvesting and related purposes, and traditional medicine, as central to economic and subsistence activities. Even in economically developed nations such as Singapore, Australia and Japan, indigenous peoples are dependent on traditional knowledge and practices for wild food and animal harvesting for food, medicine and other basic needs. Hunting, gathering and fishing continue to contribute a substantial part of the diet and basic needs for populations in rural and remote areas.

Therefore, this Report emphasises that the well-being of large human populations is at stake because of the potential for widespread loss of traditional and indigenous biodiversity-related knowledge and natural resource management systems, especially as a result of diminishing natural resources through overexploitation, particularly land clearing and commercial forestation, the spread of urban conglomerates, rapid social and cultural change as a result of economic development, population transfers for development projects, and other factors. Forests, fisheries water resources and waterways are particularly at risk.

In many cases, these risks are acknowledged by nation states, and it is noteworthy that cooperative arrangements between development agencies, NGOs and countries has led to the identification of such risks and the initiation of programs to preserve traditional knowledge and practices to sustain the livelihoods of local and indigenous communities. By example, the primary objective of the UNDP-funded project (BGD/00/G31) in Bangladesh is to develop a national Biodiversity Strategic Action Plan taking into consideration, among other factors the direct dependence of a majority of the population on biodiversity and natural resources and the linkages between biodiversity loss and poverty.

1.0.4.3 Language diversity and the state of retention of biodiversity-related knowledge

The late Darrell A. Posey, until his untimely death, Director of the Programme for Traditional Resource Rights of the Oxford Centre for the Environment, Ethics and Society, University of Oxford, as well as Visiting Researcher with the Brazilian National Council for Science and Research Professor at the Federal University of Maranhão wrote:

> The 1988 Declaration of Belém introduced the now familiar phrase: 'the inextricable link between cultural and biological diversity'. Subsequently that link has been increasingly investigated through studies of ethnobiology, ethnoecology, and linguistics. Clearly the taxonomic systems, emic perceptions, and codified knowledge of overt and covert ethnobiological categories depend on language as a major vehicle for cultural transmission. Together with the understanding that many previously assumed 'natural' ecosystems are in fact 'cultural landscapes', and that many 'wild' plants are indeed human-modified, the role of traditional ecological knowledge and natural resource management strategies have become central to effective conservation of biodiversity. This is formally and legally recognized in the Convention on Biological Diversity.

Maffi (1998) argues that that original idea in the Declaration should be extended to include *linguistic* diversity as also inextricably linked to biodiversity. The evidence is compelling: Harmon (2001) compared the IUCN list of 12 'megadiversity' countries (McNeely *et al* 1990) to his own list of countries by number of different 'endemic' languages (that is, languages spoken exclusively within a given country's borders, which means the majority of the smaller languages of the world, accounting for most of the world's linguistic diversity).

Ten out of the 12 megadiversity countries (or 83%) -- Australia, Brazil, China, Colombia, India, Indonesia, Malaysia, Mexico, Peru and Zaire -- also figure among the top 25 countries for endemic languages (Maffi 1998). More than 80 per cent of countries that have great biological diversity are also places with the greatest number of endemic languages. Countries with large numbers of languages are those with the most forests, are nearer the tropics and with mountain ranges. The same factors affect the

number of bird species. As Maffi (1998) shows, the relationship between culture and biodiversity is 'inextricable':

> At the local level, linguistic and cultural distinctiveness has often developed even among human groups belonging to the same broadly defined cultural area or whose languages are considered to be historically related, and within the same bioregion. As local groups have adapted to life in specific ecological niches, they have developed specialized knowledge of them, and specialized ways of talking about them, to convey this vital knowledge and ways of acting upon it for individual and group survival.

In reference to Australian Aboriginal tribes, the anthropologist, the late Norman Tindale, stated: 'Coincidences of tribal boundaries to local ecology are not uncommon and imply that a given group of people may achieve stability by becoming the most efficient users of a given area and understanding its potentialities' (Tindale 1974:133). The same could be said in hundreds of other cases of local peoples around the world.

On the Indian sub-continent, where there is extensive and well-catalogued linguistic diversity, most languages have remained alive thanks to bilingual or multilingual government policies. Only a few tongues are disappearing, mainly in the Himalayas and the Pamir Mountains in Central Asia and Afghanistan. In the Andaman Islands (in the Gulf of Bengal), there are only a few dozen people left who speak Önge and Shompen.

The Pacific region described in the *Atlas of the World's Languages in danger of Disappearing* (the Atlas, Wurm, 2001) - which includes Japan, Taiwan (China), the Philippines, Insular Malaysia, Indonesia, Papua New Guinea, the Solomon Islands, Vanuatu, New Caledonia, Fiji, Micronesia, Polynesia and Australia - contains more than 2,000 living languages, a third of the world total. Papua New Guinea alone counts at least 820, a world record for linguistic density. The Atlas says the region's languages are generally alive and well, with the exception of Australia, where few of the indigenous languages have survived.

1.0.4.4 Religious beliefs and practices of indigenous and local peoples with relevance to biodiversity conservation

The role of religious institutions, leaders and belief in preserving traditional knowledge is significant in several countries. The contribution of religious institutions to the state of retention of such knowledge has been critical. For instance, in Bhutan, His Majesty King Wangchuck has stated: 'Throughout the centuries the Bhutanese have treasured their natural environment and have looked upon it as the source of all life. This traditional reverence for nature has delivered us into the twentieth century with our environment still richly intact. We wish to continue living in harmony with nature and to pass on this rich heritage to our

future.' The Royal Government of Bhutan and its people have implemented this goal, and have set up policies and programmes which forego short term profit at the expense of long term loss of its biodiversity heritage' (BAP 1997).

According to Buddhist and pre-Buddhist philosophies, the mountains, rivers, streams, rocks and soils of Bhutan are believed to be the domain of spirits. The Buddhist respect for all living things has led to the development and adoption of ecologically friendly strategies—a solid foundation for a National Biodiversity Conservation Strategy. This, coupled with the Buddhist tenet that the acts of this life will be rewarded or punished in the next, provides a powerful motivational principle for sustaining Bhutan's natural resource base including its outstanding biodiversity.

The Biodiversity Action Plan for Bhutan (BAP 1997:23) reports that Bhutan was identified as the centre of 221 Global Endemic Bird Areas: 'Bhutan's ecosystem harbours some of the most exotic and endemic species of the eastern Himalayas and the country has the highest proportion of forest cover and of protected areas of any Asian nation.' The BAP for Bhutan (*ibid*) draws on Buddhist principles in explaining its success in preserving biodiversity, in particular forests:

> The preservation of the country's rich biological diversity can be attributed to two factors, the visionary and enlightened leadership and the strong conservation ethic of the Bhutanese people. Conservation is not a new idea to the Bhutanese. Buddhist teachings and practices have fostered a respect for all life forms and a deep reverence for nature. The profound respect for the natural world is a central tenet of Buddhism. Buddhism believes in conservation of nature and giving back to the earth what one has taken from it, and also in the sanctity of life. The importance of protecting nature in all its manifestations has permeated Bhutanese consciousness and has become integral to the Bhutanese way of life. Therefore, preservation of the environment, as well as of sacred and cultural heritage sites in an integral part of the Bhutanese value system. Bhutan has chosen a 'middle path' in its development efforts by adopting a policy of sustainable development integrating conservation and economic development. …The wise and conservative environmental policies have rendered Bhutan as the only country in the region that has been able to increase the area under forest cover from 64 % in the early sixties to 72.5 % now. 26.23 % of the total land area representing all climatic and Biodiversity zones is under protected area management, protecting an unknown number of species and Flora and Fauna and invaluable genetic material. Bhutan can boast of an environment which is still largely intact and in its pristine state. … in 1995 … the 73rd session of the National Assembly mandated that the country must maintain not less than 60% of the country under forest cover for all times to assure that long term sustainability takes precedence over term economic gains.

The Biodiversity Strategy and Action Plan for the Lao PDR, recognising that Lao PDR continues to possess a rich biological diversity that can provide the basis for sustainable national development and village livelihoods, also reports that public documentation of traditional culture and knowledge is collected in all Buddhism temple of Lao PDR (Lao People's Democratic Republic questionnaire response)**.**

China reports that:

> Many famous spots of Taoism and Buddhism, as well as other 'Spirit Mountains' are places where the biological resources are better protected. Through setup of rules and conventions by local people, the good traditional knowledge is maintained and developed, and the conservation of biological diversity is facilitated. For example, there are 400 'spirit mountains' in Xishuangbanna. These 'spirit mountains' have been protected by the local communities of Dai Nationality.

The Ford Foundation also provided financial support to the Xishuangbanna Tropical Arboretum in Yunnan to study the relationship between arboretum and the traditional religion (Buddhism) of Dai Nationality and the role of religion in the conservation of biological diversity. Over 100 botanic species are regarded having important significance to the religion.

Australia's National Strategy for the Conservation of Biological Diversity recognises the unique systems of governance and cosmology that confer responsibilities for management of natural resources on Aboriginal and Torres Strait Islander communities. It states:

> These traditional approaches and outlooks persist in many parts of Australia; in other areas, despite the historical undermining of indigenous structures, contemporary Aboriginal and Torres Strait Islander cultures maintain a lively interest in, practical knowledge of, and concern for the well being of the land and natural systems.

In India, Navdanya, an NGO funded by the British Council, undertook a project on the conservation of traditional crop diversity through religious practices (biophilia). In the project, community priests (in collaboration with Navdanya staff) in Chamoli, Uttarakhand, motivated farmers to save and exchange crop seeds of folk varieties through the fora of social and religious ceremonies.

1.0.5 Threats to the retention of traditional biodiversity-related knowledge

Having established the existence of traditional biodiversity related knowledge held by indigenous peoples and local communities, it is now necessary to assess threats to which it is subjected. There are four indicators considered in this section to gauge the threats to traditional biodiversity related knowledge. These are: land and sea tenure issues and loss of territory that sustains indigenous peoples and local

communities; cultural absorption of indigenous peoples and local communities into dominant societies as indicated through language loss; biodiversity loss and its impact on traditional biodiversity-related knowledge; and, the loss of traditional biodiversity related knowledge in post conflict areas.

1.0.5.1 Land and sea tenure issues and loss of territory that sustains indigenous peoples and local communities

Loss of territory, whether through expulsion of populations or destruction of territorial integrity through over-development, protected area gazettals, and inappropriate land tenure, impact severely on indigenous peoples and local communities because it deprives them of their homes and livelihoods. Examples of these impacts that pose risks to the retention of biodiversity-related knowledge occur throughout the literature.

One case exemplifying the expulsion of local peoples from their traditional territory is that of Moronene, Indonesia, as provided by AMAN: 'Using strict legal conservation criteria, the Park's management sees the indigenous people as a threat and restrictive methods will be used to keep the people away or expel them from the protected area. The indigenous people of Moronene in Tobu Hukaea-Laea have been threatened by expulsion by the state under the operation titled Operasi Sapu Jagat (OSJ) which comprises elements from District and Sub-district Administrations, Forestry Agencies, Buton Police, Kaisabu Military Force 725, Rumbia Administration and several civilians. So far, the operation has taken place four times, namely OSJ I in December 1997, OSJ II in December 1998, OSJ III in September 2000 and OSJ IV in April 2002. In the absence of legal recognition of the communities' rights to the land declared by the state as national park, the indigenous people living there is considered illegal inhabitants and looters of the park. Ironically, during a few meetings between the communities and the governmental officials, the officials admitted that the state de facto recognized the land as customary land, but the communities were excluded from the management on the ground that the law had declared the land as national park' (Sombolinggi questionnaire 2002 cited in Ferrari n.d. unpubl. msc.).

Land and sea tenure arrangements for indigenous and local peoples can impact on biodiversity and the capacity of the local populations to sustain their traditional subsistence economies, knowledge of their natural environments and management practices. In Southeast Asia, agroforestry operations impact on the territories of indigenous peoples and local communities severely, most importantly by diminishing their land and sea bases and there by their access to natural resources.

The restitution of land and sea tenure to enable access to natural resources is a key demand of indigenous peoples and local communities because of these impacts. This was a focal point of discussion at the conference on 'Indigenous Peoples and Protected Areas in South and Southeast Asia - from Theory to Practice' held in Sabah, Malaysia in December 1998. Conference delegates of indigenous communities called for an accounting of past injustices and the restitution of ancestral territories alienated because of

the creation of the protected areas (Tauli-Corpuz 1999 cited in Ferrari, n.d. unpubl. msc.).

Inappropriate or inadequate land and sea tenure arrangements, such as state national parks and marine parks, diminish the capacity of indigenous peoples and local communities to retain biodiversity knowledge by restricting their customary subsistence activities and other uses of territory. This is a predominant and contentious issue in Australia where legislators are reluctant to devolve responsibilities to indigenous landowners and managers, and where government environmental programs are designed to fund actions on publicly-held or agricultural lands and provide meagre assistance for biodiversity conservation by indigenous peoples. Despite inadequate recognition and support from governments, successful indigenous community- based initiatives, such as the Top End community ranger movement, has enabled indigenous landowner and managers to steward the biodiversity of vast areas of northern Australia, and thereby retain and transmit their encyclopaedic traditional knowledge of their environments.

1.0.5.2 Cultural absorption of indigenous peoples and local communities into dominant societies as indicated through language loss

Nation state absorption and assimilation of these groups and assertion of ownership and control of their knowledge systems for commercial and national purposes, also poses a great threat to the capacity of these groups to sustain their social and economic systems and even, in some cases, to the continued existence of these groups. This Report also emphasises that the tendency in nation state responses to Article 8(j) to dismiss these systems as viable human life ways in the expanding modern global economy is a threat to traditional knowledge systems, one that should be addressed in future development of measures under the CBD to protect and retain biodiversity-related knowledge and natural resource management systems of indigenous peoples and local communities. This is discussed further in Part II.

The literature highlights language loss as an important indicator of the threat to the retention of traditional biodiversity related knowledge. Over the past 500 years, about 4.5 per cent of the total number of described languages has disappeared, compared with 1.3 per cent of birds and 1.9 per cent of mammals. Colonisation has been the principal contributing factor in human language loss because of the introduction of settler languages as the dominant, usually official, language of education instruction and commerce. Sutherland, writing in *Nature*, stated that when comparisons were made to threatened animals, there were a substantially higher proportion of languages that could be considered ‘critically endangered’, ‘endangered’ or ‘vulnerable’ – the three classifications used to describe the threat to birds and mammals.

According to the Atlas (Wurm, 2001), about half of the 6,000 or so languages spoken in the world are under threat. Over the past three centuries, languages have died out and disappeared at a dramatic and steadily increasing pace, especially in the Americas and Australia. Today at least 3,000 tongues are

endangered, seriously endangered or dying in many parts of the world.

The Atlas shows the 'crisis areas' where linguistic diversity is most threatened. Experts generally consider a community's language to be 'endangered' when at least 30 per cent of its children no longer learn it.

Scholars concur generally with the Atlas. Maffi (1998) provides an assessment of the status of the world's human languages in the following:

> There are an estimated 5,000 to 7,000 languages spoken today on the five continents (Krauss 1992; Grimes 1996). *Ethnologue,* the best existing catalogue of the world's languages (13th edition, Grimes 1996), gives a total of 6,703 languages, of which 32% found in Asia, 30% in Africa, 19% in the Pacific, 15% in the Americas, and 3% in Europe. Of these languages, statistics put together by conservationist David Harmon (Harmon 1995, based on the 12th edition of the *Ethnologue,* Grimes 1992) indicate that about half are spoken by communities of 10,000 speakers or less; half of these, in turn, are spoken by communities of 1,000 speakers or less. Overall, languages with 10,000 speakers or under total about 8 million people, less than 0.2% of an estimated world population of 5.3 billion (*ibid*.)
>
> On the other hand, of the remaining half of the world's languages, a small group of less than 300 (such as Chinese, English, Spanish, Arabic, Hindi, and so forth) are spoken by communities of 1 million speakers and above, accounting for a total of over 5 billion speakers, or close to 95% of the world's population. The top ten of these alone actually comprise almost half of this global population (*ibid*.).

In many parts China, the situation is uncertain. The Atlas says the pressure from Chinese is especially strong in the northeast and northwest, western Xingjian and the far south province of Yunnan. It also says that Australia, New Caledonia and Taiwan are three crisis areas. Of the 23 local languages in Taiwan, 14 are yielding to the pressures of Chinese.

According to Clyne and Kipp (n.d.) in Australia, statistics from the 1996 Census show the total numbers of speakers of Aboriginal languages 44,017, in a population of about 20 million, most of whom speak English. A listing of endangered languages much respected listing by scholars is also maintained by *Ethnologue*, hosted by SIL International

The *UNESCO Red Book on Endangered Languages* (2003) is an extensive listing of endangered languages that provides details of each language listed on a database. Of particular interest for this Report, is the section on endangered languages in Asia and the Pacific (Wurm & Tsuchida 2003).

Maffi's assessment is that most of the world's linguistic diversity is carried by very small communities of

indigenous and minority people. These are the languages, Maffi points out that have been and continue to be under threat, as a result of:

> … ever-growing assimilation pressures that promote incorporation of their speakers into 'mainstream' society and language shift (the progressive abandonment of a native language in favour of an acquired majority language at the societal level).

Maffi collates the statistics that show that currently spoken languages being 'nearly extinct' range between approximately 6% and 11% (Harmon 1995, Grimes 1996). In some projections, as many as 90% of the world's languages may disappear during the course of the next century (Krauss 1992). These figures clearly portray a threat to linguistic and cultural diversity that is orders of magnitude greater than the threat that loss of biological species and ecosystems represents for biodiversity.

Maffi (1998) refers to an extinction crisis among human languages. She cites linguistic anthropologist Russell Bernard has estimated that already there may be 15% fewer languages now than 500 years ago, when the era of European colonization began (Bernard 1992). Losses have been especially marked in the Americas and Australia. And the trend is now accelerating throughout the world, with Australia and the Americas (especially the U.S.A.) still in the lead.

Numbers of speakers of languages among indigenous and local populations may be quite small, compared to the 300 languages spoken by most of the world's population. Many things can lead to people abandoning their native tongues, the Atlas explains. One is the break-up or transplanting of a community, when individuals or small groups find themselves immersed in a different cultural and linguistic environment, which soon stifles their native language. A tongue can also disappear when its users come into contact with a more aggressive or economically-stronger culture. Adults encourage their children to learn the language of the dominant culture, especially as a means to get a job. Some minorities and their languages come under attack from groups of people who destroy their environment to extract minerals, timber and oil from it. The situation is worse when the authorities systematically discourage the use of local languages in schools, local government and the media.

But an endangered, moribund or even extinct language can be saved through a determined language policy. In Japan for example, only eight people spoke Ainu on the island of Hokkaido in the late 1980s, but today it is being revived after years of ostracism and decline. An Ainu museum has been opened there and the language is being taught to young people, who are rediscovering it.

The threats to multilingualism are similar to the threats to biodiversity. It is the inextricable link between culture and biodiversity that is lost 'when external forces begin to undermine traditional cultures, pushing them into the 'mainstream' (Maffi 1998). In turn, local languages lose their crucial function of communicating and upholding such knowledge, beliefs and wisdom that are increasingly less significant

and intelligible to younger generations. Furthermore, local knowledge does not 'translate' easily into the majority language to which minority language speakers switch; and along with the dominant language usually comes a dominant cultural framework that begins to take over. Because in most cases the knowledge of indigenous peoples and local communities is only carried by oral tradition, when shifts toward 'modernization' and dominant languages occur and oral tradition in the native languages is not kept up, local knowledge is lost. Due to its place-specific and subsistence-related nature, local ecological knowledge is at especially high risk of disappearing.

1.0.5.3 Biodiversity loss and its impact on traditional biodiversity-related knowledge

Biodiversity loss impacts on traditional biodiversity-related knowledge—such knowledge systems become irrelevant to the daily lives of indigenous peoples and local communities as their ability to manage and harvest natural resources diminishes.

Rapid deforestation, as discussed below in more detail, is a major threat to indigenous peoples and local communities and thus to their capacity to retain traditional biodiversity-related knowledge. This is especially the case in Asia. Commercial tree plantations, illegal logging, dam megaprojects, and forced displacement are responsible for the accelerated destruction of those precious ecosystems, resulting in the destruction of biodiversity. In Bangladesh, annual deforestation rate has reached 3.3%. Rubber, teak and eucalyptus monocultures for export have provoked negative ecological effects by the substitution of part of the forest, as well as conflicts between local communities belonging to the 13 ethnic groups that inhabit the region. The authorities, such as forestry departments, that promote plantations have proved unable to control illegal logging by gangs (World Rainforest Movement 2001).

Traditional knowledge has not been retained in some areas as a result of biodiversity loss through overexploitation of resources. Ferrari (n.d., unpubl. msc.), reporting on the situation in Southeast Asia, states that:

> Although much of the over-exploitation of resources has been caused by pressures and agents outside the local communities (national and international forces, policies and institutions) in some cases local communities gradually lost interest in the sustainable use of the resource as their rights and responsibilities towards them were not recognised.

Bangladesh, for example, will suffer economically for the loss of biodiversity as its economy is almost dependent on natural resources because of the reliance of the population on agriculture and fisheries. Rapid loss of biodiversity has threatened the existence of the country's five categories of fauna and their populations will become irretrievably depleted if urgent measures are not taken to protect their food chain by conserving their wetland habitats. The endangered fauna are 41 species of birds, 58 reptiles, eight amphibious and 54 fish and 40 mammals (The Independent 2002).

1.0.5.4 Loss of traditional biodiversity knowledge in post conflict areas

Military and civil conflicts have impacted severely on indigenous peoples and local communities, causing the collapse of rural economic systems in some cases, and thereby diminishing their capacity to continue their traditional subsistence activities. The impact on their knowledge systems is acknowledged, for example in Afghanistan, where traditional management of water resources was a key feature of their agricultural and herding economy. The UNEP Afghanistan Post-Conflict Environment Assessment report (2003) gives a comprehensive overview of the state of the environment in Afghanistan. It recognises that the country is rich in regional differences and cultural diversity. The report identifies that throughout its national history, governance in Afghanistan has been largely based on the provincial, municipal and local levels, rather than centrally led from Kabul. Traditional decision-making bodies at the village level were responsible for biodiversity management. For example:

> Natural resources were also often managed at the community level. For example, water resources were frequently managed by a *Mirab* (water master) elected by farmers to make key decisions on water distribution, operations and maintenance, as well as to be the link to government water authority personnel. In many regions, woodlands and rangelands were monitored by community-based wardens or rangers (UNEP 2003:95).

The report also identifies that:

> …with the onset of conflict, many local decision-making systems collapsed, leaving an institutional void across the country. In some areas, local commanders took power and imposed their own systems of governance. In others, local communities maintained a high level of autonomy and decision-making authority, and strongly resisted all instances of external interference (*ibid*).

The UNEP report (*ibid*) recognises that the ability of the Afghan Government to implement projects in each of these sub-programs will depend almost entirely on financial support from the international community. It recognises that:

> Solutions relevant to local communities that are based upon local community traditions and practices offer the best way forward. However, a return to the 'former ways' is no longer possible, given the current degraded state of the resource base, population and migration stresses, and other international pressures. Strong central regulations are clearly needed to respond to these new challenges, coupled with a partnership role for local communities in implementation and enforcement. Communities will also require adequate technical support from the central government in order to rehabilitate degraded land, develop land-use plans, and balance resource use with conservation (*ibid*).

Years of war and the destructive forces of dictatorial regimes pose a serious threat to the retention of traditional knowledge of the indigenous peoples of the Middle East and in particular Afghanistan, Iraq and Iran.

In Iraq, Saddam Hussein's regime is responsible for the destruction of the vast marshlands in Southern Iraq, the Mesopotamian Marshlands. It is estimated that less than 10 per cent of Iraq's marshlands hold water today and the marsh dwelling peoples have been forced to relocate or accommodate the influx of displaced persons from a massive internal migration forced by the war (*ibid*). This redistribution of community and ethnic groups and the loss of the natural resources of the marshlands environments has severely disrupted the way of life of the indigenous marsh dwellers who have suffered economic and social upheaval as a result of the catastrophic impact on biodiversity.

Iran is in the very early stages of developing mechanisms for the retention and protection of traditional knowledge. The Iranian Government's Thematic Report on Forest Ecosystems for the CBD identifies that Iran has not developed methodologies to advance the integration of traditional forest related knowledge into sustainable forest management, in accordance with Article 8(j). The report identifies rural communities residing in forest areas as a threat to biodiversity conservation and supports the relocation efforts of these peoples (NBSAP Secretariat 2001:8). This Government strategy is a direct threat to the ability of indigenous peoples and local communities to retain their traditional bodies of knowledge that are maintained through the ongoing practice of agroforestry, subsistence and cultural activities on their custodial estates.

1.1 State of traditional knowledge of plant genetic resources for food and agriculture

Humans have been manipulating organisms and exploiting their biological processes and characteristics for thousands of years. The earlier forms of biotechnology –selectively breeding animals and plants and using micro organisms to make, among other things, wine, beer, bread, cheese or soy products- have been adapted by societies around the world and have steadily improved over time. These traditional or conventional techniques are still used today in rural areas and industry alike and differ merely in sophistication and scale. The ethnobiological knowledge of indigenous peoples and local communities is a vital resource in the conservation of biological diversity through its use over millennia in managing and maintaining environments and providing sustenance for peoples and their domesticated animals.

In the Middle East, indigenous peoples and local communities retain bodies of traditional knowledge and practices for the conservation of the biological diversity and productive livelihoods in a region characterised by harsh, arid and semi-arid environments. Traditional methods of irrigation and crop production have maintained food and grazing resources in marginal agricultural lands and continue to support sedentary and semi-nomadic peoples.

The management of water and soil using indigenous knowledge and technologies is crucial to the contemporary sustainable development of marginal agricultural lands and the livelihoods of rural communities living in arid lands. For example, the traditional system of *hema* governs grazing in these lands through allocation of rights and rotational usage to promote carrying capacity. The harvesting and conservation of water has also been managed traditionally for millennia to produce sustainable agriculture and water resources for nomadic and settled peoples. The technologies of the *qanat* irrigation system and landscape terracing are efficient and sustainable as demonstrated in their durability (Batanouny 2000).

In Australia, from 1993 to 2000, the Parks and Wildlife Commission of the Northern Territory's Ethnobotany Task and Aboriginal traditional owners collaboratively researched and published the ethnobiology of eleven Aboriginal language groups and an Indonesian group. Traditional plant knowledge was promoted through the production of posters, identikits, larger thematic books and plant use walks; seven posters on plant use themes were produced; four identikits relating to bush tucker and medicine were produced; projects were initiated with 15 language groups; and a database was developed to store ethnobiological data (ANZECC 2001). It is estimated that indigenous peoples across Australia used some 10,000 native plant species for food (Fourmile-Marrie 1999). Not only an important source of daily sustenance, but, in the future, commercial harvesting may also provide economic benefits. The nascent native wild food, pharmaceutical, personal health care, cosmetic and plant nursery industries may enable economic returns appealing to small communities with few other economic opportunities.

In its Second National Report to the Secretariat of the CBD, the Australian Commonwealth Government notes it has funded the Ethnobiological Project – Indigenous Knowledge of Biodiversity 2000– 2001. The project aims are to develop protocols and guidelines/methodologies for the protection and transmission of traditional ethnobiological knowledge between generations. Women are an integral part of the transfer of ethnobiological knowledge to younger generations and are therefore incorporated into the program in areas such as food and craft. (2nd Report to CBD). The ANZECC (2001) reports that:

> …the project will record and facilitate the transmission of indigenous knowledge of biodiversity from older Aboriginal and Torres Strait Islander people to younger generations in the Wet Tropics World Heritage Area of Queensland and in the Nantawarrina Indigenous Protected Area in the northern Flinders Ranges of South Australia. The project would also involve the preparation of an inventory of the knowledge held by the indigenous communities.

For societies dependent on traditional agriculture, old cultivars are a precious resource to their populations. The Bhutanese Biodiversity Action Plan for biodiversity conservation notes that Bhutan has evidenced a commitment to protecting its indigenous crops and species from the introduction of imported high-yield varieties (BAP 1997:96). The Plan elaborates that species are likely to be imported only after

an assessment of the overall costs and benefits to the country has occurred, and should include an assurance that the indigenous species and varieties will not be lost as a result. Furthermore, the document states, local and indigenous knowledge should be recognised as important components of surveying and inventorying of crop varieties.

In Cambodia, traditional biotechnology has been in use for hundreds of year for plant and animal selection, beer, soy products and rice and palm wine production. In regards to plant genetic resources, crop cultivation in Cambodia is largely dependent on traditional cultivars, old primitive varieties and land races. Almost 80 per cent of the area is cultivated with local, varieties of rice, maize, sesame, vegetables and sweet potato. Traditionally farmers have been using their own produce as seeds for the next crop without any changes. New pests and pathogens have contributed significantly in the loss of landrace diversity. Rich diversity has been built up in crops like rice, maize, soybean, sesame, sweet potato, peanut and vegetables. Home gardens and backyards possess many different species. There are serious information gaps pertaining to the distribution and occurrence of wild species and wild relatives of crops in Cambodia. This is primarily due to a lack of systematic scientific studies or their taxonomical description and delineation.

Lack of financial resources to protect old cultivars and other plant genetic resources is a recurring problem throughout the regions examined in this Report. By example, in its Second National Report on Implementation of the Convention on Biological Diversity: 2001), China reported that:

> The protection of agricultural biological diversity has been listed in the priority action plan for CBD implementation in China. China also formulated its China Biodiversity Conservation Action Plan for Agricultural Sectors and the China Biological Germplasm Resources Conservation Action Plan. Nevertheless, due to its large population, China first of all has to tackle the problem of grain production for near 1.3 billion of population. The agricultural bio-diversity conservation is then actually as medium priority. China also has a poor financial capacity for an overall implementation of the action plan for agricultural biodiversity conservation. The financial resource is limited. For example, the Guangzhou wild rice needs urgent *in situ* protection, but the government has not enough funds at present to establish a protected area (State Environmental Protection Administration of China, China's Second National Report on Implementation of the Convention on Biological Diversity 2001).

Traditional Indian food is highly diversified; an ordinary lunch consists of many vegetables, grains and herbs. The Krishi Prayoga Pariwara and the Indian Government's Karnataka Forest Department have undertaken studies on the relationship between the preparation of local dishes, human health and agriculture in rural regions of India. In the Shimoga district, situated in Karnataka in the Western Ghaats,

for example, there are some 160 recipes for *tambli,* a traditional dish which uses many local herbs. Some 130 plant species are used in the preparation of the different *tamblis*. The parts used vary from tender leaves to flowers, fruits, seeds, bark and roots (Kumara & Anand, 1999). Ranjay Singh (2003, pers. comm.) has conducted research with resource-poor farmers, and concluded that their knowledge of sustainable cash cropping of indigenous sugarcane includes a management system based on a 'chain of cooperation' by which farmers assist each other in the management of indigenous sugarcane production *in toto*. Indigenous cropping knowledge has contributed to the sustainability of the sugar cane crops because the traditional practices and approach involved in management of indigenous sugarcane is environmentally sound, economically viable, socially justifiable and, is more humane in nature. This knowledge reduces the risks and contributes to the refinement of new innovations by proper selection of crops and their varieties for sustainable production. Ranjay Singh's work shows that understanding of and collaboration with an indigenous knowledge system can inform agriculture and food policy initiatives and technological interventions that lead to sustainability in agriculture.

The Israeli Ministry of Science, Culture and Sport and the Ministry of Agriculture host the Israel Gene Bank for Agricultural Crops and are responsible for implementation of a strategy for national genetic resources conservation in Israel. The Israeli Government through its ministries supports research and development on the application of 'scientific methods' to further develop indigenous knowledge (Levy & Aynalem 1997).

Agriculture in the Lao PDR is based on small farm production of largely subsistence nature. The government's agricultural development objectives seek to stimulate a more market-oriented agricultural economy, to attain food sufficiency, to diversify agricultural production, and to stabilise shifting cultivation. In many parts of Lao PDR increasing population pressure on available land for shifting cultivation has resulted in declining soil fertility and increased weed infestation through decreased fallow periods. In some areas, however, where traditional fallow practices are maintained, shifting cultivation may be sustainable provided that the population growth rate is stabilised. The Laotian Government, however, is committed itself to ending shifting cultivation. It intends to achieve this by means of a number of elements: using technology to improve the productivity of crops and livestock; improving land-use planning at the local level; formalising land tenure through a process of land allocation; developing alternatives to agricultural income for shifting cultivators; and, in some cases, resettling communities.

On the island of Bali in Indonesia, agricultural development temporarily adopted advanced technology during the 1970s and 1980s, but reverted to the traditional agricultural techniques due to the visible impact on their ecosystem. Agricultural planting, watering and harvesting schedules are controlled by the *subak*, which is a community based co-operative organisation that is under the authority of the religious

doctrines (Barth 1993:63-75). Rice production in Bali remains non-mechanised and is under the control of the *subak*. Bali did expand crop production on a subsistence level to include coffee and some fruits and spices for domestic use. The most significant aspect of agriculture in Bali is the lack of mention of environmental degradation in ethnologies published by anthropologists from the 1950s through the 1990s, who have studied culture in Bali. There are no accounts of soil erosion, degradation, salinization, water pollution, depletion of the aquifer, or salt water encroachment written about agriculture on Bali.

In the Philippines, sweet potato is grown using three main production systems — commercial farms in the lowlands, 'slash and burn' fields in the uplands, and small-scale home gardens. Over 200 cultivars have been recorded in one highland province. By contrast, in an upland municipality in the southern Philippines, nearly half of the 55 cultivars that existed several decades ago are no longer cultivated. Increased commercialisation of sweet potato production in the lowlands of the northern Philippines has reduced the number of cultivars from 25 to just two dominant types over the past 50 years (Campilan 2002). However, there are also a host of cross-breeding efforts by Philippines indigenous peoples on animals and plants. The Igorot people have been cultivating and breeding wide varieties of *camote* (sweet potatoes) which were a staple for them before rice was introduced. When rice was introduced, different varieties were developed by Igorot people to suit the environmental conditions in their territories. In one village alone there are more than ten varieties of rice seeds planted for different weather and soil conditions (Tauli-Corpuz n.d.). Many varieties of other root crops like cassava and taro have also been developed.

In both the Philippines and Indonesia, cultivar diversity is a key element of local sweet potato production systems. Local dietary patterns and preferences, adaptability to local growing conditions, and traditional beliefs and practices serve as a major impetus to conserve sweet potato diversity. However, increased market orientation and new livelihood opportunities have reduced this diversity, mainly threatening those cultivars that have no immediate economic value. This underscores the need for farmers to conserve cultivar diversity for strategic purposes against the backdrop of changing socio-cultural, economic and agro-ecological environments.

In Yemen, the Faculty of Agriculture of Sanaa University, the French Embassy's Cultural and Co-operation Section, the French Centre for Yemeni Studies, and the Yemeni Ministry of Agriculture and Irrigation and the Social Fund for Development organised a seminar in 2000 as a forum for discussing the contribution of the indigenous knowledge of Yemeni farmers to contemporary Yemeni agriculture. Issues addressed at the conference on ‘The Place of Ancient Agricultural Practices and Techniques in Yemen Today: Problems and Perspectives’ included traditional Yemeni pest control and water harvesting practices. In his article on traditional pest control, Ba-Angood (2000) writes that the people of Yemen were among the earliest to use biocontrol agents for the control of agricultural pests. For example, farmers

in Wadi Hadramout traditionally used oil for the control of pests and diseases on date palm fruits. He recommends the national development of Integrated Pest Management programs for main agricultural pests making use of traditional and indigenous knowledge of Yemeni farmers and carrying out applied research to verify the ancestral knowledge on pest control practices (Ba-Angood 2000).

In the United Arab Emirates (UAE) Government which has rapidly modernized in the last thirty years, through its Ministry for Higher Education and Scientific Research has funded studies on the heritage of the UAE which has included research on the traditional diets of the people of the Ain Ain area (Ministry of Information and Culture in the UAE 2003). The Zayed Foundation for Research and Traditional Medicine in Abu Dhabi conducts biological research on the components of natural medications from plants and herbs (Emirates Centre for Strategic Studies and Research n.d.).

In Thailand, the tradition of using and maintaining non-domesticated plants in house gardens reported by Moreno Black, Somnasang and Thamthawan (1994) is an expression of culture, and represents an intense interaction between humans and plants. The preservation of botanical diversity is directly related to local knowledge and practices, and closely bound up with microeconomic and social processes. Human beings play a role in maintaining select species, providing botanical refuges and serving as an active force in shaping the landscape. In north eastern Thailand, women's gardening practices have been instrumental in the preservation, selection, consumption and exchange of non-domesticated plants.

Moreno-black *et al* (1994) report that the house garden is important as an informal 'experimental station' where women can transfer, encourage and tend indigenous species as they try them out and adapt them for use (Kimber, 1978; Ninez, 1987). As a result, these gardens often represent a refuge where less common species and varieties are preserved. During their study, they obtained information on women from 60 of the 110 households in a village, making use of interviews, focus groups and surveys of the different house gardens.

The house gardens studied contained 230 different plant species. Individual garden diversity ranged from 15 to 60 different species. Non-domesticated plants were found in 44 (88%) of the gardens; of all of the plants recorded during the surveys, 29% were classifiable as non-domesticated species. However, there was considerable variation between the individual gardens. Some contained no non-domesticated plants at all, while the garden which was most diverse contained 10 different non-domesticated plant species.

The considerable variation among the gardens studied is probably related to the high degree of control exercised by individual women with respect to plant choice and management. Home gardens are tailored to each woman's own preferences, although personal constraints such as off-farm employment, family size, household composition and local traditions are of influence on the number and variety of non-domesticated species. Most plants are used for food, although a number of women grow plants for their

medicinal, religious or decorative value. Some of the non-domesticated species appeared spontaneously (*gurt eng* 'birth themselves'), but a sizable number of plants were taken from the wild or obtained from friends, neighbours, other villages or government agencies. A few of the plants had been deliberately spared when the forest was cleared for house-building by the parents or grandparents. Species which are no longer in frequent use, such as those used for soap or paper-making, still have a place in the garden.

1.2 State of traditional knowledge of animals and microorganisms for food and other purposes

Despite an emphasis on crop production, mixed farming systems—where crops and animals are integrated on the same farm – constitute the backbone of small-scale Asian agriculture, especially in rain fed areas (Peso, Gray & Saithanoo 2002). Among the advantages of livestock ownership by poor farmers are the diversification of products, the reduction of risk, and the efficient use of system components (i.e. land, crops and water). Furthermore, animals contribute to soil fertility through nutrient cycling (manure). Moreover, the rising human population, urbanization and the income-driven changes in food habits in Asia will necessitate a twofold or threefold increase in the supply of animal products by year 2020 (Delgado *et al* 1999).

In Australia, the NBSAP recognises traditional ecological knowledge of animal resources and the sustainable development of animal populations used or owned by indigenous interests. Australia's NBSAP under Objective 1.8 addresses the sustainable harvesting of wildlife by indigenous people:

> Recognising the importance of harvesting of indigenous plant and animal species; both on land and in water, to the wellbeing, identity, cultural heritage and economy of Aboriginal and Torres Strait Islander peoples, provide assistance for the establishment of management programs for ecologically sustainable harvesting of wildlife by individual communities (DEST 1996:15).

Specifically, Action 1.8.3 of the Strategy stipulates the provision of resources for the establishment of cooperative species recovery plans for endangered and vulnerable species of particular significance to Aboriginal and Torres Strait Islander communities (CoA 1996:15). Examples of government investment and participation in collaborative research and development of endangered species management include the Dhimurru Land Management Aboriginal Corporation's ongoing research on sea turtles funded partly by the Commonwealth through the Australian Research Council and the Natural Heritage Trust.

The management of threatened and endangered species is regulated through the EPBC Act. With respect to the development of recovery plans [s270(3)(e)] for such species, regard must be had to 'the role and interests of indigenous people in the conservation of Australia's biodiversity'. The process of developing threat abatement plans [s271] and wildlife conservation plans [s287(3)(e)] under the Act must also involve consideration of indigenous interests. Similar provisions also occur in relation to migratory

species [s216(3)(c)] and listed marine species [s258(3)(c)] (Fourmile 2000).

In Japan, secondary grasslands have been maintained by periodic firing for grazing, thatching and pasturage. With changes taking place in the livestock industry and lifestyles nationally, sufficient numbers of farm workers have been difficult to secure. Yatsuda field with low productivity requires great efforts to properly maintain its natural environment.

Secondary natural environments have been shaped by human impacts, but particularly economic change in recent years, human intervention in maintaining these environments has diminished. The Japanese has instigated a program to maintain secondary natural environments, allocating them for use as sites for living spaces and production. The conservation of secondary natural environments that serve as the habitats of familiar organisms, such as livestock, is being promoted through such measures as the establishment of the 'Communities for Communication with Nature and Native Living Things' and the maintenance the habitats of secondary forests designated as natural monuments. National trust activities are being supported through tax measures.

In the Middle East, in Iran, the Ministry of Rural Development undertook a study on the economic status of rural women in three provinces of southwest Iran: Fars, Kohgiloie and Boyerahma. The focus was on the indigenous poultry management practices of women in rural villages. The findings will be used to adapt government rural development strategies to the needs and knowledge of these women (Shahvali & Ardekani 2000).

In Bangladesh, at a workshop to develop the Biodiversity Strategic Action Plan (BSAP) organised by IUCN-Bangladesh, it was reported that there is rapid loss of biodiversity that has threatened the existence of the country's five categories of fauna and they will be depleted forever if urgent measures are not taken to protect their food chain by conserving their wetland habitats. The endangered fauna are 41 species of birds, 58 reptiles, eight amphibious and 54 fish and 40 mammals (The Independent 2002).

Participants at the workshop were told that, due to loss of biodiversity, Bangladesh has already lost twelve-horned deer, rhino, blue sheep, freshwater crocodile, *raj shokun* (vulture) and stork. Various kinds of flora were also reported to be facing extinction as water bodies were drying up.

As previously noted in this Report, Bangladesh has identified that it will suffer economically for the loss of biodiversity as its economy is almost totally dependent on agriculture and nature. They have agreed to formulate a strategy by identifying endangered species and thereby taking up an action plan to save endangered species of flora and fauna.

In Lao PDR, the IRDC together with the Government of Lao PDR undertook a project aimed at developing the sustainable management of the country's fisheries resources. The focus of the project is on integrating rural development, sustainable fisheries development and community-based resource

management. The project addressed important issues of biodiversity, conservation, and sustainability of indigenous fisheries. The outputs of this project will be an information base on the fisheries which will assist rural development activities in selected provinces and the development of technologies for the production of juvenile indigenous fishes for restocking of natural waters on which community management of the resource will depend.

In its Second National Report, China reported that it had:

> …conducted a joint project with WWF for protection of Giant Panda and its habitats, and also jointly conducted an international workshop on conservation and management of biological diversity in Tibet. IFAW supported China on commending of nature reserves in China and the work of wild life protection. Relevant societies and non-governmental organizations in China also attended some international meetings regarding the biological diversity which are organized by international NGOs.

In Nepal, Craig describes traditional grazing practices in Mustang and indigenous veterinary techniques, specifically as they relate to horses. Although horses only comprise a small fraction of the total domestic livestock kept by Mustang residents, they are the fulcrum of social status and one of the most significant measures of wealth. Similarly, equine care is the most intricate and developed of all local veterinary practices.

Traditionally, women in Pakistan have been integral to the sustainable development of fisheries resources. However, Mohammad Ali Shah of the Pakistan Fisherfolk Forum acknowledges that women are often marginalised in the large number of agricultural communities who now derive their livelihood from fishing. A recent initiative of the Women in Development section, of the Pakistani Departments of Agriculture, Animal Husbandry, and Forestry aims to reinvigorate women's involvement in the economies of rural communities through the project: 'Participation of Rural Women in Managing Natural Resources: A Case Study of Establishing Fish Ponds at Komi-Kot, District Muzaffarabad, Azad Kashmir'. This project is supported by the World Bank. The program is headed by a Coordinator (based at Muzaffarabad) and supported by one Lady Field Supervisor and two Field Agents at the district level. It aims to build capacity in rural communities through the development of micro-enterprise aquaculture (Ali Shah 2002).

1.3 State of traditional medicinal knowledge

Traditional medicinal knowledge, while being discussed here separately, can be seen as another reliable indicator of the existence of traditional biodiversity related knowledge. Traditional medicine, as Posey and Dutfield (1996) note, is set of knowledge that has the potential to be quite well documented, and the WHO Traditional Medicine Strategy for 2002-2005 identifies the public health objectives that would

support a focus on such documentation.

Posey and Dutfield (1996:82) acknowledge that the problem with traditional medical knowledge currently is that this knowledge tends not to be documented, or if it is, it is unlikely to be easily accessible. To address this problem WIPO and a number of developing countries led by India and China are seeking to develop traditional knowledge digital libraries, which will detail considerable amounts of traditional knowledge already in the public domain in forms accessible to patent examiners, such as the WIPO International Patent Classification (IPC) system. Traditional knowledge digital libraries have been the subject of deliberations by a WIPO specialised Task Force including representatives from China, India, the USPTO, and the EPO, examining how such libraries can be integrated into the existing search tools used by patent offices (Posey and Dutfield 1996:81).

China has developed legislative mechanisms and policies for the development of traditional medicinal resources (plant and animal) over the last 10 years. Traditional Chinese Medicine is recognised as a national priority in biodiversity conservation through the Biodiversity Conservation Action Plan (1994). This Plan has developed measures to sustainably develop traditional medicinal resources through the Chinese Government's State Environment Protection Administration and its Traditional Chinese Medicine Department. These include legislation such as the Law for Wild Animal Protection and the Law of Traditional Chinese Medicine Management 1984 and policy development, such as the Industrial Policy for 1991-2000 of the Department that gives high priority to agriculture and the integration of sustainable use and production objectives for wild medicinal resources. The Law of Traditional Chinese Medicine Management (1984) protects traditional medicinal resources. Article 3 provides that the State will protect the wild medicinal resources and encourages the breeding of Chinese traditional medicine. The Regulation Concerning the Management and Protection of Wild Medicinal Resources (1987) lists wild medicine plants and animals for protection and provides that the wild medicinal resources shall be managed sustainably for conservation and utilisation.

WIPO lists the Traditional Chinese Medicine Database as one of only three national databases of traditional knowledge produced by its members. The other two are in India, as discussed below.

The second database of traditional medical knowledge is being developed by the Indian National Institute of Science Communication and the Department of Indian System of Medicine and Homoeopathy. These organisations have established a Traditional Knowledge Digital Library (TKDL) which is initially targeting Ayurveda (a traditional knowledge system of medicine) and proposes to document the knowledge available in the public domain (the existing Ayurveda literature) in digitised format. Information from about 35,000 *Slokas* (Verses and Prose) and formulations will be inputted on a database and it is expected that the website will have approximately 140,000 Ayurveda pages. The data will be made available in several international languages (English, Spanish, German, French, Japanese and

Hindi) (Posey 1996:81).

The Traditional Knowledge Resource Classification (TKRC) is an innovative, structured classification system that has been designed to facilitate the systematic arrangement, dissemination and retrieval of the information in the TKDL. The TKRC is based on the International Patent Classification system, with the information classified under section, class, subclass, group and subgroup for the convenience of its use by the international patent examiners. But it provides greater definition of traditional knowledge information by expanding one IPC group (i.e. AK61K35/78 related to medicinal plants) into about 5000 subgroups. The TDKL will give legitimacy to existing traditional knowledge (Posey 1996:81).

The third database, the People's Biodiversity Registers (PBRs) that includes traditional medical knowledge, collates documentation of indigenous peoples' and local communities' knowledge on the status, uses and management of biological resources. As part of their daily subsistence activities over centuries, indigenous and local peoples have acquired knowledge about the use of a variety of biological resources. The information is almost exclusively orally transmitted. PBR envisages the creation of decentralised country-wide database on status of biological resources. Some other similar documentation projects concerning traditional biodiversity-related knowledge include the Gene Campaign which has undertaken work on documentation of biodiversity and knowledge relating thereto among three tribal populations: the Munnars in South Bihar (in the Chotanagpur region); the Bhils of Madhya Pradesh; and the Tharus of the Terai region. Medicinal plants and knowledge related thereto was documented with the help of educated tribal youth. Elders in the village, medical practitioners and traditional healers were consulted in the collection and understanding of the information.

The government of the Lao People's Democratic Republic has established the Traditional Medicines Resource Centre (TRMC), which is working with local healers to document details of all traditional medicines with a view to promoting a sharing of practices within Laos. The TRMC is collaborating with the International Co-operative Biodiversity Group in efforts to discover prospective medicinal products. Any benefits, profits or royalties realised from plants and knowledge recovered during the collaboration will be shared with all the communities involved (Posey 1996:82).

In Australia, the Cooperative Research Centre for Aboriginal and Tropical Health (a Government-funded research centre) is undertaking various research projects aimed at combining traditional indigenous medicinal knowledge and healing practices with Western therapies. 'Sharing the True Stories' is one such project that aims to interrogate not only the issues and knowledges surrounding the provision of renal health services for indigenous people, but the methodologies, protocols and knowledge ownership involved in doing cross-cultural research. This is achieved through a self-reflexive, team-based and action learning model for doing research in culturally appropriate and useful ways. Small, local TKDLs are also being established, such as the Galiwin'ku Traditional Knowledge Centre in Northeast Arnhemland,

Australia.

In Indonesia, a registration system for the use of traditional medicines has been established. In the recent WIPO survey on existing forms of intellectual property protection for traditional knowledge, the laws on 'trade secrets' were referred to as an avenue for the protection of registered medicinal uses of biological resources. Indonesian intellectual property law on trade secrets accommodates the protection of Indonesian medicinal herbs (*jamu*).

The Indonesian Ministry of Health Policy (2002) suggests that there has been a rise in use of medicinal plants but that this has not been supported by an increase in the systematic cultivation and preservation of plants even though Indonesia does have a system of Registration of widely-used medicinal herbs.

In 1990, the Indonesian Ministry for Health, Bogor Agricultural Institute, the University of Indonesia and Institute of Science and Technology undertook a study called *Biota Medika*. This study documented medicinal traditional knowledge and suggested that the protection of forests was vital for the medicinal traditional knowledge industry. The study pointed to a lack of integrated approach in this area. This study further emphasised the marketing of medicinal products to researchers and commercial developers. It reports that there are currently 810 companies in the Indonesian traditional medicine industry (Pramono 2002).

In the Philippines, there are recent specific legislative measures on the protection of wildlife, plant varieties and traditional medicines and there is formal recognition to traditional healers by the Institute of Traditional and Alternative Health, a statutory body established under the Traditional and Alternative Medicine Act 1997. The other relevant legislative initiatives are the Wildlife Resources Conservation and Protection Act 2001 and the Plant Variety Protection Act 2000.

The Philippines government is a signatory to the Cusco Declaration (2002) and is working towards a *sui generis* regime; international cooperation and information sharing regarding the source of genetic material in patent applications similar to the recent Swiss proposal.

Unfortunately, traditional practices relating to harvesting flora and fauna for medicinal purposes has caused biodiversity loss. Ferrari (n.d., unpubl. msc.) gives examples from Burma and Cambodia where

> …wildlife parts are over-harvested and traded for use in traditional medicine. In Cambodia too, traditional medicines and charms have lead to depletion of slow lorises, bears (teeth), elephants (tails) and plants such as eaglewood and yellow vine. The pressures of the modern cash economy and the fact that land and resources are becoming ever more scarce, do change the way in which some traditional practices impact ecosystems and species.

Given the economic pressures being exerted on indigenous peoples and local communities

1.4 State of traditional knowledge systems concerning the following ecosystem categories

There is a significant, and necessary, overlap between the earlier sections of Part I and the following discussion. Even so, the information found in the literature provides a useful insight into the state of retention of traditional biodiversity related knowledge of indigenous peoples and local communities in each bioregion.

1.4.1 Forests

Many of the arid- semi-arid countries of West Asia do not as yet have a well-developed system of protected areas, and forested areas are generally located in mountainous regions. In Southeast Asia however, one of the most heavily forested regions in the world, most governments recognise that deforestation is a serious issue. Ferrari's research (n.d., unpubl. msc.) found that:

> From 1970 to 1990, Southeast Asia lost 31.4 million ha of forest a rate of about 15,700 sq km per year, which increased by 48% to 23,260 sq km per year during the 1990-2000 decade (ASEAN 2001). … Most of this loss has been taking place since local communities were deprived their use and control of local resources, which started with colonialism and accelerated since the 1970s as a consequence of national industrialisation policies and raising world's demand for natural resources (Ferrari, n.d., unpubl. msc.).

The alienation of indigenous peoples and local communities from their traditional forested estates has major implications for the state of retention of traditional ethnobiological knowledge. The ability for these people's to develop and maintain their ethnobiological knowledge relies on their capacity to participate in the sustainable management of natural resources, and practice sustainable livelihoods through practices such as hunting, gathering, cultivation and herding. This participation is contingent on government recognition of the rights of indigenous peoples and their contribution to cooperative and collaborative measures for conservation of biodiversity through, for example, measures to provide compensation to indigenous peoples and local communities for loss of land and sea territory, to engage local and indigenous communities in the development of protected areas, and to provide support for community-based natural and cultural resource management agreements and institutions. Such institutions include systems of traditional governance used to maintain biological diversity through sustainable land use. For example, the Akha are a group of mountain peoples spread over southern China, eastern Myanmar, Laos, northern Vietnam and northern Thailand. They have been traditionally governed by a body of customary law called *zang.* These rules and regulations include detailed knowledge about the rich local flora and fauna, which informs the management of the village forests. In order to protect their settlements and to have a source of food and medicine, the Akha commonly maintain a forest belt around their villages, even in heavily deforested areas. In Laos, a Village Forestry Law was adopted in 1997, but the traditional

practices of local communities are severely threatened by the expansion of logging operations (Akha website).

In Bangladesh, for instance, three types of forests—the evergreen and semi-evergreen rainforests in the eastern region and at the Chittagong Hill Tracts region, the moist and dry deciduous forests, known as *sal* forests, situated in the central plains and the northeast region, and the tidal mangrove forests along the coast—are under threat, and little is being done to save them. In the meantime, annual deforestation rate has reached 3.3%. The Chittagong Hill Tracts comprise 14,000 square kilometres, which represent about 10% of the country area. Some of the major species in these forests grow to gigantic heights and diameters. The tallest part of the canopy is generally formed by deciduous and semi-deciduous trees while the understorey is of evergreen type. Bamboo formations and savannah are also present. Several important species of mammals inhabit the area: elephants, bison, deer, leopards, and the symbolic Royal Bengal tiger. Birds such as the imperial pigeon, the green pigeon, and the white winged wood duck are also present.

Traditional knowledge of agroforestry practices is vital for the economic, cultural and physical well being of indigenous peoples and local communities who rely on small-scale industries for their livelihood. For example, in Afghanistan, forest products such as pistachio nuts, walnuts, wild cumin and apricots are important sources of income for rural communities. The FAO is currently undertaking a survey of Afghanistan's horticultural industries including agroforestry products to assist the Afghan government to develop sustainable management strategies for these resources (FAO 2003)

Governments and international and development NGOs cite population pressure as a major cause of forest destruction in some Asian countries. In Bangladesh the annual deforestation rate has reached 3.3%. The forced displacement of indigenous peoples and local communities from forested areas due to commercial plantations, logging and dam construction funded by international development projects has contributed to a loss in the ability to practice and maintain subsistence agricultural practices and knowledge, for example, in the agricultural lands and forests belonging to the hill people, mainly the Chakma. The UNESCO World Heritage Site of Sundarban represents the largest mangrove vegetation complex in the world. The Sundarban is the source of livelihoods --fish, honey, timber, fuelwood-- for local populations of between 500,000 and 600,000 people. A project designed to restore the degraded mangrove ecosystem is funded by the Asian Development Bank, the Global Environment Facility (GEF) and the Nordic Development Fund. The Sundarbans Bio Diversity Project is however being criticised by IEDS (Friends of the Earth – Bangladesh) because of the emphasis on ecotourism and the non-participatory way in which management decisions and conservation planning are proceeding (WRM's bulletin Nº 44, March 2001).

In Thailand, the Yadfon Association (an NGO), has undertaken a project on the conservation of river and

coastal ecosystems in Trang Province, Thailand. In the coastal area of Trang province and the Palin River basin, over 50,000 people practiced subsistence lifestyles in the rainforest, sago palm (*Metroxylon sagus Rottb*) forest, nypa palm (Nypa fruican) forest, mangrove forest, and seagrass beds. These forest environments have been widely degraded as a result of development projects and the state of retention of traditional knowledge is subsequently at risk.

The situation of forests and forest dwellers under the Suharto regime in Indonesia has been one of the most tragic in the region. Forests in the country have been rapidly depleting since the 1960s with the practice of handing out logging concessions to military commanders and political allies. The International Centre for Research in Agroforestry has noted:

> In the early 1980s, in what could be considered one of the largest lands grabs in history, the government implemented a forest zonation system that classified most of the Outer Islands as forestlands. Seventy-eight percent of Indonesia, or more than 140 million hectares were placed under the responsibility of the Department of Forestry and Estate Crops. This included over 90% of the outer islands. Estimates place as many as 65 million people living within these areas. According to the Department of Forestry, the creation of the State forest zone nullified local 'Adat' rights, making thousands of communities invisible to the forest management planning process and squatters on their ancestral lands. As a result, logging concessions, timber plantations, protected areas, and government-sponsored migration schemes have been directly overlaid on millions of hectares of community lands, causing widespread conflict (ICRAF n.d.).

Under the Suharto regime, all 'non-owned' forests became the property of the State, often thereby depriving traditional (adat) communities of their traditional lands. National forestry laws thus enable the government to allocate traditional lands to 'forest concessionaires' (for example, logging companies) without local people's consent. Through government-directed colonisation programs and large-scale schemes, forest loss escalated during the 1970s and 1980s and as demand outstripped supply, it hastened the extension of the logging frontier into the remoter parts of Kalimantan, Sulawesi, the Moluccas and Irian Jaya (West Papua). By the late 1980s, NGOs were estimating deforestation in Indonesia at around 1million hectares a year and recent studies put the rate of forest loss at some 3 million hectares per year. Conversion of forests to palm oil plantations contributed massive losses through land-clearing and uncontrollable forest fires during the second part of the 1990s.

Case Study: The Dayak people in the Kayan Mentarang National Park

The Kayan Mentarang National Park situated in the interior of East Kalimantan, Indonesian Borneo, lies at the border with Sarawak to the west and Sabah to the north. With its gazetted 1.4 million ha, it is the largest protected area of rainforest in Borneo and one of the largest in Southeast Asia. The history of the

natural landscape of the park is inexorably intertwined with the history of its people. About 16,000 Dayak people live inside or in close proximity of the Kayan Mentarang National Park. The communities living in and around the park are still 'adat' communities, largely regulated by customary law or 'adat' in the conduct of their daily affairs and the management of natural resources in the customary territory or '*wilayah adat'*. The customary chief or '*kepala adat'* administers the customary law with the help of the customary council or '*lembaga adat'*. All elected officials at village level and prominent leaders of the community sit on a customary council. Traditional forest areas with protection status or strict management regime exist. '*Tana ulen'*, for example, is tana or land whose access is restricted, limited. It is an expanse of primary forest rich in natural resources such as rattan (*Calamus spp*), sang leaves (*Licuala sp*.), hardwood for construction (e.g. *Dipterocarpus* spp, *Shorea* spp, *Quercus* sp), fish and game, all of which have high use value for the local community.

The Nature Reserve established in 1980 was strict protection status according to which no human activities were allowed inside the protected area. WWF together with LIPI (Indonesian Institute of Research) and local people conducted long-term social science research ('Culture and Conservation', 1991-1997) and experimental community mapping to show that the communities had rightful claims to the land and its resources. The results represented the basis to recommend a change of status from Nature Reserve to National Park in 1994 (where traditional activities are allowed). The WWF project identified the issue of social entitlements, and particularly lack of tenure security, as a priority intervention for the period 1996-2000, as this was a key issue among Dayak people in the interior. Although Dayak people had been living in the area and made use of forest resources for centuries, the forest they inhabited and managed was 'state forest' (including under National Park status) with a situation of open access whereby the state could decide to allocate exploitation rights or decide to establish a conservation area without prior consent of the local communities. Local communities had very little power in trying to defend the forest or secure the source of their economic livelihood against logging companies, mining exploration, or outside collectors of forest products. Under these circumstances, the WWF Kayan Mentarang project decided to give priority to activities in the field that could lead to the recognition of 'adat' claims and 'adat' rights son that indigenous communities could continue to use and manage forest resources in the conservation area (community mapping; qualitative assessments of the use and availability of forest resources with economic value; workshop for the recognition of '*tana ulen'* or forest under traditional customary management; participatory planning for zonation recommendations and the redrawing of the external boundaries of the park; drafting of 'adat' or customary regulations for the management of the national park; strengthening of local organisations and institutional development, Phase 1996-2000).

Following the recommendation of the 'adat leaders' from the KMNP, FoMMA, or Alliance of the indigenous People of Kayan Mentarang National Park, was then formed (and formally established on

October 7, 2000) by the leaders of the ten customary lands of the park. The purpose was to create a forum for conveying the aspirations of the indigenous communities and debating issues concerning the management of natural resources in the customary lands of the KMNP. FoMMA is concerned with guaranteeing protection of the forest and the sustainable use of natural resources in the ten customary lands of the NP area as well as protection of the rights of indigenous people and increasing their economic prosperity in and around the national park area. FoMMA now legally represents the indigenous people of the park on the Policy Board (Dewan Penentu Kebijakan), a new institution set up to preside over the park's management. The Policy Board includes representatives of the central government (agency for Forest Protection and Nature Conservation), the provincial and district governments and FoMMA. The operating principles of the board emphasise the importance of coordination, competence, shared responsibilities, and equal partnership among all stakeholders. The board was formally established in April 2002 with a Decree of the Ministry of Forestry, which also spelled out that the park is to be managed through collaborative management (a first in Indonesia!) (Cristina Eghenter, WWF Indonesia Kayan Mentarang Project).

Australia has developed a *National Forest Policy Statement: a New Focus for Australia's Forests* (1992) through the ANZECC. It presents a vision for Australia's public and private forest estate based on ecologically sustainable development (1992:3) and presents government forest management agencies as the stewards of the community's assets. It states that Australia governments agree to manage public native forests for their multiple conservation values including cultural significance to Aboriginal people. This policy statement promotes nature conservation reserve systems based on the principles of comprehensiveness, adequacy and representativeness. These principles are the foundations for the Commonwealth Government's National Reserve System of protected areas including Indigenous Protected Areas (IPAs). It also provides a framework for the development of Regional Forest Agreements (RFAs) that is a bioregional planning approach involving multiple forest values and stakeholder involvement including indigenous peoples. Settlements on native title have been negotiated through the RFA process.

Iran is in the very early stages of developing mechanisms for the protection of forests and forest inhabitants. The Iranian Government's Thematic Report on Forest Ecosystems for the CBD identifies that Iran has not developed methodologies to advance the integration of traditional forest related knowledge into sustainable forest management, in accordance with Article 8(j). The report identifies rural communities residing in forest areas as a threat to biodiversity conservation and supports the relocation of these peoples (NBSAP Secretariat 2001:8).

In India, the Government, forest companies, WWF and indigenous peoples and local communities have implemented a major forest ecosystem and biodiversity conservation initiative in the form of the Forest

Certification process. This is a process of identifying and managing the supply chain of forest-related products for sustainable development of forest resources. It controls the quality of products through the provision of written assurances to buyers- a certification. Certification is done by agencies like the Forest Stewardship Council and includes principles of recognition of indigenous people's rights, and the long term development of sustainable forest management practices. There is a vital wood carving industry in India with a diverse range of products and traditions that support indigenous and local economies and communities. The traditional knowledge of these communities with respect to forest biodiversity is retained through the ongoing practices of carving for religious centres and artworks, customary purposes (i.e. funerary purposes), household and religious items and icons. A variety of timbers are used and forest ecosystems are managed for selective harvesting of tree species. The Forest Certification process formalises a system of ownership rights and responsibilities, secures the economic basis of production and supply for local communities and distributors through guaranteed markets, and enhances investment in sustainable forest management through incentives for agroforestry and reduced exploitation of native forests (WWF- India 2003).

Ferrari (n.d. unpubl. msc.) notes positive examples of measures to retain and protect traditional knowledge through ensuring the participation of indigenous peoples and local communities in forest management in the Southeast Asian region:

> …While there is no fully reliable data on the exact number or the total areas covered by Community Conservation Agreements (CCAs), some emerging data relate that there are hundreds or even thousands of community forests in Thailand… more than 500 community-based coastal resources management (CBCRM) initiatives in the Philippines (Tanchuling interview 2001) and a large number of community forests in the highlands, as well as a growing number in Indonesia and Cambodia. Not all these local initiatives are operating successfully, but learning networks are being set up to draw lessons from these community efforts (Ferrari, n.d., unpubl. msc.).

It is arguable that the 'top-down' approach to planning for biodiversity conservation and infrastructure projects, together with poor regulatory and enforcement capabilities of governments, constitute the most important causes of deforestation and forest degradation in many parts of Asia, and are contributing to the loss of traditional knowledge through alienation of communities from their custodial estates and homelands.

1.4.2 Dryland and steppes ecosystems

Traditional water harvesting in dryland and steppe ecosystems sustains many indigenous peoples and local communities throughout West Asia and the Middle East. The practices of water harvesting vary

across regions and nation-states and represent a complex and exhaustive set of traditional bodies of knowledge, institutions of governance (including community-based water authorities, traditional laws regarding the allocation and distribution of water rights) and infrastructure for water consumption and the sustainable development of agricultural production. These bodies of knowledge and techniques are under threat in some areas due to government policies of modernisation and rural development for an expanding population. The introduction of new water technologies such as deep wells and pumping stations has altered water flows and distribution and hence the traditional and local water management regimes that sustain biodiverse habitats that have evolved through interactions between humans and their environments.

The traditional water harvesting system of *qanats* is used in Arabia. In Iran the traditional irrigation system of *qanats* represents a complex set of technologies and practices of renewable water harvesting and is crucial to the agricultural economy of Iran. However, more recently the construction of deep-wells in rural communities has disrupted the communal patterns of social adaptation and organisation of Iranian villages organised around the distribution and management of the water resources of the *qanat* system (Wessels and Hoogeveen 2002). Three years of extreme drought (to 2001) in Iran saw the Iranian Government commit funds to reconstruction of damaged *qanats*, the traditional irrigation system of underground wells and water channels.

In Syria, *qanats* are protected under the Syrian Law of Antiquities and registered as cultural sites. However, there is no national plan for the protection and management of *qanats.* A case study in participatory planning for traditional water management piloted the renovation of *qanats* in Northern Syria. Wessels and Hoogeveen (2002) from ICARDA found that successful renovation of *qanats* in Syria is technically possible but thorough social and hydrological assessment is required in advance of renovation. A pilot renovation was done in 2000 in a village East of Aleppo and our team initiated a *qanat* cleaning based on the priorities and traditional knowledge of the community.

Qanats are to this day the major source of irrigation water for the fields and towering hillside terraces that occupy parts of Oman and Yemen. They have for some 2000 years allowed the villages of the desert fringes of the Arabian Peninsula to grow crops and fodder. In these villages, there are complex ownerships of water rights and distribution canals (Waterhistory.org n.d.). In Oman the traditional irrigation system of *qanats* is called the *aflaj* system and has been used to supply water to rural communities for agriculture over centuries. It is a traditional technology that conveys groundwater to the surface through the construction of deep *aflaj* shafts and irrigation tunnels. The existing oasis in inner-Oman depends upon this traditional water-collecting system. The social structure of rural communities is governed by the distribution of water rights and custodial responsibilities for maintenance of the *aflaj*.

The Omani government has initiated many projects to assist communities in maintenance of the *aflaj*

systems including funding and infrastructure support and for maintenance of *aflaj*. The system is recognized as the main national irrigation water source as it provides most of the northern Oman small and large farms with water along with other villages' domestic needs (Nizwa.net n.d.). Due to the arid-semi-arid status of much of its land base, water management is a primary concern in biodiversity conservation in Oman. The Omani government recognises a serious need to protect water resources and in 2002, the Ministry of Regional Municipalities, Environment and Water Resources hosted the Oman International Conference on Development and Management of Water Canals. The 'Muscat Declaration' which followed this Conference recognised a need to retain traditional water conveyance systems to secure the stability of agricultural communities. While the lack of water gives rise to sophisticated local knowledge, the Declaration also acknowledged the challenges and difficulties faced by such communities (bin Tariq Al- Said 2002).

In Yemen, the traditional agricultural economy was based on the Yemeni *sayl* irrigation, a system for collecting water in walled fields. Brunner identifies that: 'In recent years the demand for water in Yemen has been satisfied mainly by groundwater. Depending on only one water source is against Yemeni tradition. Rain fed agriculture must be strengthened by the government and traditional methods of rainwater harvesting for agricultural and domestic use must be forced' (Brunner 2000).

According to Jordan's *First National Report to the Parties of the Convention on Biological Diversity* (The Hashemite Kingdom of Jordan 2001) rangelands cover about 91 % of the Jordan and include Badia, steppes and parts of Ghor and Wadi Araba. The report identifies that rangelands play an important role in providing the livelihood of local communities and that traditional grazing cycles were originally based on a transhumance system that allowed for the natural regeneration of forage. However, it also concedes that 'traditional grazing rights are mostly ignored.' The Ministry of Agriculture is currently developing a comprehensive rangeland strategy for Jordan which may address the specific issues raised by Article 8(j).

1.4.3 Marine and coastal ecosystems

Many indigenous peoples and local communities in the region practice coastal resource management using traditional bodies of knowledge and techniques. However, issues of coastal degradation due to pollution, land use changes and the predominance of non-traditional uses of the coast have threatened these communities' ability to undertake traditional resource management. Ferrari (n.d., unpubl. msc.) reports for the Southeast Asia region that:

> The region is endowed with the highest coral reef biodiversity on earth, but 88% of this irreplaceable ecosystem is threatened, with 50% of it considered 'highly' or 'very highly' threatened (Burke *et al*, 2002). Along the coastline, 65% of the mangroves have been lost and 20-50% of seagrass beds are estimated to be degraded (UNEP 2001).

In developed countries such as Australia, governments are taking measures to assist in the retention of indigenous and community-based conservation of coastal biodiversity. For example, Yolngu Aboriginal communities in Northeastern Arnhemland in the Northern Territory are involved in a Commonwealth Government-funded *Waterwatch* program with other groups and community members to monitor and evaluate the status of the region's water, provide cross-cultural learning opportunities for Yolngu and non-Aboriginal people about the significance of water and water management practices, and provide resources for sustainable management of coastal resources through retaining traditional resource management governance structures in the form of indigenous institutions such as the Dhimurru Land Management Aboriginal Corporation. Through *Waterwatch Australia*, communities work to maintain or improve biodiversity in their local waterways.

The *Coasts and Clean Seas* program is an Australian Federal Government funding initiative under the Natural Heritage Trust (NHT). To a limited extent, Aboriginal groups have accessed financial support through this scheme for biodiversity management activities including the monitoring and caretaking of marine turtle populations (through Dhimurru and the communities of Umbakumba, Ngukurr and Borroloola in the Northern Territory.) Some of these groups have collaborated with researchers to document traditional knowledge of marine animals, their migration patterns and their habitats (Kennett *et al* 1997).

The Lebanese Government in its National Biodiversity Strategy and Action Plan for Lebanon promotes the concept of integrated villages for the collaborative development of the practices of local coastal communities engaged in traditional economic activities including salt extraction ponds, olive oil and carob extraction and fishing. The Plan has develop actions to identify all types of traditional industries associated with coastal environments and develop partnerships between community-based organisations (i.e. fisherpeople's associations), local municipalities and national government One such action is the Coastal Area Management Project (CAMP-Lebanon) Project managed by the Lebanese Ministry for the Environment. The project is promoting the retention of local and indigenous knowledge and practices through supporting traditional economic activities, cultural heritage and marine conservation areas (UNEP 2003).

In developing countries in the Asian region, NGOs are cooperating with the governments of nation-states to develop coastal management initiatives that enable indigenous peoples and local communities to retain and sustain their traditional bodies of knowledge, practices, and environments, including traditional aquaculture and artisanal fisheries.

In Thailand, the rapid development of intensive shrimp aquaculture and use of destructive fishing gear has caused widespread environmental damage that has threatened the traditional livelihoods of local peoples of the Trang province. The Yadfon Association (an NGO) has responded by supporting the organisation

of traditional fishers who have joined together to stop using destructive fishing gear and practices, such as dynamite fishing, and cyanide poisoning. The fishers have successfully petitioned the local government to provide enforcement of fishing regulations, and fisherfolk and rice farmers have worked together to rejuvenate coastal vegetation. As an outcome of these actions, coastal ecosystems have been ameliorated and economic return from ecologically sustainable development of coastal resources to local people has increased.

The Philippines Government has taken active steps to ensure the retention of its marine and coastal environments. The Marine Protected Areas Project, as well as research-based conservation schemes such as *Project Seahorse* has enabled traditional fishery practices, bodies of knowledge and ecosystems some protection against the exploitation of marine resources.

In Thailand, the loss of coastal mangrove forests due to prawn aquaculture, resort development and charcoal production is posing a significant threat to Thailand's aquatic avifauna and native fish stocks. The knowledge and practices of indigenous peoples and local communities who practice traditional artisanal fishing is threatened by the decline in fish stocks. Farmers living adjacent to Thailand's diminishing forests are also adversely affected by the uncontrolled exploitation of coastal natural resources, as they are dependent on a declining supply of supplementary subsistence products and ecological services. These trends have provoked a nationwide response among rural people who are now demanding the rights to manage their local natural resource systems. These rights have now been enshrined in Thailand's Constitution (1997), under which rural communities will be afforded considerably greater rights and responsibilities with respect to the management of Thailand's natural resources, and the sustainable use and conservation of its biodiversity including coastal systems (Vivajsirin *et al* 2002:269-70)

Rapid changes in resource use in the coastal waters of Viet Nam, mainly as a result of intensification of different forms of aquaculture, are occurring in areas such as the Tam Giang lagoon. Many changes occur at the expense of small-scale, poorer farmers/fishers. As the impact of these changes expands there is a need to understand the dynamics of present management (or lack of same) and to explore opportunities for community management mechanisms. The previous research, supported by the CIDA/IDRC funded VEEM program, will be continued but on a more targeted basis. Ecosystem impacts of changes in resource management and livelihood diversity strategies are key concerns. Administrative units for management in relation to ecological units will be the initial focus as the research team seeks to better understand present systems and develop recommendations for improved management.

1.4.4 Island ecosystems

Island ecosystems in many cases are fragile in terms of their susceptibility to effects of natural processes

exacerbated by development activities and unsustainable land use practices. These may affect the conservation of biodiversity through processes such as coastal erosion, eutrophication of waters and species extinction, and the retention of biodiversity-related knowledge through the alienation of indigenous peoples and local communities from their island estates, the destruction of local, subsistence economies through overexploitation and tourism and the degradation of island environments due to edge effects.

In the Philippines, an ecological assessment of Ulugan Bay, Palawan, was undertaken as part of the UNESCO initiative, 'Environment and Development in Coastal Regions in Small Islands'. This project is a collaboration involving local government, provincial institutions, the national park's authority, the Navy, and other NGOs. The resource assessment was preceded by consultations with officials from the five communities (*barangays*) surrounding the bay, so as to formalize the role of the local community in the process. The assessment aimed to provide input to a fisheries and biodiversity database and to train participants in data collection and the application of the scientific information to resource management and planning (UNESCO 2002).

Also in the Philippines, indigenous peoples have been engaged in an ongoing struggle to oppose mining on their traditional territories. Catalino Corpuz of *Minewatch Asia* and the Mining Communities Development Centre reports that: '…the case of Panay Island, for example, local opposition forced the withdrawal of Minera Mt. Isa. People have also resisted mining companies already in their territory doing exploration work. In Kasibu town, Nueva Vizcaya, the people held a referendum where 2,000 voted against and only seven favoured the mining operations of Arimco of Climax Mining Company.' These local struggles have been repeated on numerous islands nationally as indigenous peoples resist the encroaches of mining companies fanned by loopholes in the Philippines Mining Act that now allow them to circumnavigate the local governing bodies of indigenous cultural communities (ICCs). In some cases this has led to militant action by these communities as they demand their rights to land and resources. The state of retention of the biodiversity-related knowledges of these peoples relies on their ability to live and practice their traditions on their island estates (Corpuz 1999).

Since an international workshop on 'Human-induced damage to coral reefs' in 1985, UNESCO has been collaborating with the Indonesian Institute of Sciences (*Lembaga Ilmu Pengetahuan Indonesia* – LIPI) and other institutions to collect information on the status of coral reefs in the Seribu Islands. Several islands within the Seribu Islands complex located in Jakarta Bay have disappeared in recent decades and others are threatened. The impacts from the city on the islands ecosystems and their inhabitants include solid and liquid waste from domestic, industrial and agricultural activities resulting in pollution and eutrophication of the bay waters. Activities within the bay itself include sand and coral mining, oil exploration, fishing and tourism. UNESCO, through its Environment and Development in Coastal

Regions in Small Islands' initiative has assisted government and local communities in organising workshops to establish a framework for sustainable development in the Seribu Islands. One of the priority areas recommended for action was to develop alternative livelihoods for the islanders. This process involves measures of 'controlling access to fishing grounds to protect and strengthen traditional management systems' (UNESCO 2000). The state of retention of traditional knowledge related to managing the islands ecosystems, including marine biodiversity and fisheries resources, is therefore contingent, in this case, upon the negotiation of strategies for regulating resource use and providing economic incentives to impoverished local communities for the sustainable development of fishing practices.

The coastal islands and coastal regions of Thailand, along the eastern shores of the Andaman Sea, are home to a distinctive people, the 'Chao Lay' or 'sea nomads', whose life styles, languages and cultures differ from the rest of Thai society. One group of Chao Lay, the Moken, maintain a semi-nomadic way of life. Having frequented the Surin Islands, about 60 kilometres from Thailand's mainland coast, for at least several centuries, a group of Moken decided to establish themselves on a more permanent basis several decades ago. The Moken live as hunters and gatherers of the resources found on the land and in the sea, and they trade marine products such as sea cucumbers and shells for rice and other necessities. The 150 Moken people in the Surin Islands build their houses on stilts above the sea, and occasionally the village sites are moved in order to alleviate disputes and escape illness.

In 1981 the Thai Government declared the Surin Islands a protected area and established a national park. Under park regulations, the Moken no longer have the right to continue traditional resource harvesting, nor even to live within the park. This raises serious concern about the effects that the regulations may have on the Moken's ability to maintain their traditional culture and lifestyle.

To address these concerns, a field project was initiated in 1997 entitled 'A place for indigenous people in protected areas, Surin Islands, Andaman Sea, Thailand'. This project is implemented by the Chulalongkorn University Social Research Institute and supported by UNESCO through its Bangkok Office, the Intergovernmental Oceanographic Commission (IOC) and the intersectoral and interdisciplinary platform for 'Environment and Development in Coastal Regions and in Small Islands' (CSI).

Following a rapid appraisal of the issues affecting the Surin Islands' Moken community in December 1997, a series of workshops were held during which concerned stakeholders joined efforts to sustain a dialogue which would begin to provide for the conservation of the natural and cultural heritage of the Moken and the Surin Islands.

The first workshop, held in Bangkok in November 1998, brought together government officials,

academics and non-governmental organizations to identify the crucial issues to be addressed in order to determine sustainable development options for the Moken. A few weeks later, a second workshop was held in the Surin Islands during which the same group of stakeholders participated with the Moken in a series of activities designed to share ideas and identify the aspirations and needs of the indigenous population. A third meeting was held in March 1999 when stakeholders met to reaffirm their commitments to the project.

Following the workshops, a number of project activities were designed and are outlined in their publication. Each activity represents a step along the road to exploring sustainable development options with the Moken that allow them to maintain and enhance their lifestyle while conserving the biodiversity of the Surin Islands. The project activities include resource assessments based upon scientific and Moken ecological knowledge, preparation of reading material for Moken children, handicraft learning, basic health and welfare training, turtle conservation and giant clam mariculture. Work has already started on some of these activities and an update is included in the final chapter (UNESCO 2003).

Across the region, and in many other parts of the world, finding sustainable solutions that benefit indigenous communities and the environment, while meeting national tourism and development objectives, has become a priority. The outcome of this project may serve as a model for the region and beyond.

1.4.5 Mountain and valley ecosystems

There is s significant overlap of information between the previous ‘Forest Ecosystem’ section and this section because in the regions studied many mountains and valleys are also heavily forested. Like forests, mountain and valley ecosystems host many of the indigenous peoples and local communities that have maintained their traditional biodiversity-related knowledge systems and practices in tact because of the remoteness of mountains and the general unsuitability of this terrain to large-scale agriculture and agricultural residential communities. However, swidden agriculture, or shifting agriculture, poses a threat to the ways of life of mountain dwelling peoples who use these practices, because of the high rates of biodiversity loss and soil infertility that result from the forest destruction entailed in this mode of production.

India is host to some of the highest and most extensive mountain systems in the world. These are the Central Highlands including the Aravali range in the North West and the Vindhya Range, the Western and Eastern Ghaats and the Himalaya Region. The Himalaya Region is made up of the Western Indian Himalayas where indigenous tribes practice an economy based on subsistence agriculture and cattle rearing. The herbal wealth endemic to this region includes rare and extremely valuable medicinal and aromatic plants. Over-harvesting for use and trade has resulted in 80% depletion while some species are

on the brink of extinction, implying a serious loss to global biodiversity and retention of traditional knowledge (India Case Study, Regional Workshop on Indigenous Practices of Sustainable Resource Management 2002). There are many emergent factors that are likely to affect the state of retention of indigenous peoples and local communities living in these mountainous environments. For example, the Juangs and Paudi (hill) Bhuinyas are tribal peoples who inhabit the hilly tracts of Kendujhar District of Orissa in Eastern India, about 1,200 metres above sea level. Their traditional shifting cultivation (*Ekan*) practices have developed a repertoire of cultivated plant varieties that serve as a reservoir of valuable genes, conferring disease resistance and drought tolerance to plantations of food species. Cultivation practices have maintained a rich biodiversity in the forested mountain environments through mixed cropping and small-scale economic activity. However there are a number of changing factors that threaten the sustainable development of the traditional knowledge upon which these practices are based:

- Government modernisation inducements of subsidies for the supply of fertilizers, pesticides and high yielding varieties. Consequently, a number of indigenous crop varieties are on their way to extinction;
- Population pressure has increased many times the carrying capacity of land under shifting cultivation. While supportable capacity per unit of land yielding 2 lb. rice per head per day was 32.4 by axe cultivation and 72.0 by all other means, the present population pressure is 96.0. Hence, this traditional mode of swidden cultivation is on the decline. Also, larger forest tracts are being put under the plough;
- Forest Cover is now perceived as a source of profit. This has given rise to indiscriminate tree felling and the exploitation of forest resources, with its attendant degradation and soil erosion, threatening the very survival of countless species of flora and fauna, medicinal herbs, plants of food value and resulting in a diminishing gene pool. Bamboo that grew profusely is now extinct in this region, due to indiscriminate use. The subsistence of the forest dwelling Juangs and Bhuinyas which depended to a large extent on edible species of forest flora and fauna, is under threat. While 59% of their earnings came from minor forest produce (MFP) collection, large-scale deforestation has reduced them to poverty; and
- Changes in Land and Regulatory Policies with through greater state control means that the tribals are losing their rights over their common resources that they previously managed through their own traditional institutions and customary laws (*ibid*).

In order to address biodiversity conservation in mountain environments, the Indian Ministry of Environment and Forest established the GB Pant Institute for Himalayan Environment and Development in 1988. This agency aims to promote environmentally sound development in the Indian Himalayan Region. The core programs of the Institute include land and water resource management, sustainable development of rural ecosystems, conservation of biological diversity and indigenous knowledge systems (*ibid*).

In India, the WWF-India has produced a major case study on the conservation and sustainable use of natural bioresources by the Apatanis in Arunachal Pradesh. The Apatanis of Arunachal Pradesh, in the north east of India, inhabits the Apatani Valley of the Lower Subansiri district and practise settled

agriculture. In India, WWF-India has produced a major case study on the conservation and sustainable use of natural bioresources by the Apatanis in Arunachal Pradesh. The Apatanis of Arunachal Pradesh, in the Northeast of India, inhabit the Apatani Valley of the Lower Subansiri district and practise settled agriculture. It details the rice farming practices the Apatanis who employ their traditional knowledge embodied in the irrigation system and cultivation techniques for rice production. This terraced agriculture includes fish farming and other crops such as millet. The Apatanis are concerned about the loss of local varieties of paddy rice, the effects of population growth on their agrarian resource base, and the need to expand education and employment opportunities in their communities. In response to WWF suggestions that the Apatani peoples institute biodiversity registers, the Apatani leaders insisted that traditional boundaries and resource distributions are known and recognised within their communities and expressed concerns that a register may be misused by government to assume control of land (Chatterjee, Dey, Rana & Sastry 2000).

In relation to its implementation of Article 8(j), China draws attention to the antiquity of Chinese history and the multiple nationalities within its borders:

> Even in today's civilized world, many farmers living in remote mountainous areas, especially the minorities, still inherit, use and develop the traditional knowledge and practices that are beneficial to the conservation and sustainable use of the biological diversity.

The Iranian Government is cooperating with the UNEP through the Global Environment Facility -funded project to sustainably develop mountain environments and includes a plan to document indigenous knowledge in its project on 'Conservation of Biodiversity in the Central Zagros Mountain Forests and Steppe' (GEF/UNDP, 1997).

Traditional agroecosystem management practices of the Karen hill tribe in northern Thailand are in the process of transformation (IDRC Project 100108). Their land use systems traditionally included a shifting cultivation component characterized by a rotational cycle of land clearing, burning, cropping for 1-2 years, and relatively long fallow period of at least 10 years. Plants in regenerating secondary forest fallow areas restored soil fertility for the next cropping cycle. Although shifting cultivation often invokes images of massive forest destruction and land degradation, various studies have shown that rotational systems with these characteristics can be sustainable.

During recent decades, however, the area of cultivated land per capita has been declining with population growth and environmental restrictions, resulting in shortened fallow periods. This will likely lead to declining soil fertility, resulting in lower productivity of upland rice, and eventually in insufficient subsistence food supplies. As some studies indicate that species richness in regenerating secondary forest fallow areas are higher than in some primary forests and most permanent agricultural areas, shorter fallow

periods may bring loss of late-fallow species of nutritional and ecological importance. As a consequence, there is a significant risk that the Karen will experience both declining land productivity and inadequate food supplies, which could be expected to result in malnutrition and related diseases.

1.4.6 Inland waters

> From practical uses (livelihood, food production, sanitation, energy, transport) to recreational, aesthetic, religious, and cultural values, water affects nearly every aspect of life (World Water Council, 2003).

The water security challenges posed by deteriorating water resources affect indigenous peoples and local communities in a number of ways. River capture, large scale hydrology projects, such as dams and river diversion schemes, large scale irrigation for commercial cropping, all have an impact on river, waterway and water body health. The loss of access to rivers, and Asia is the home of some of the largest rivers in the world, is as detrimental to indigenous and local populations as loss of territory.

Ferrari (n.d. unpubl. msc.) provides a case study on community based river conservation in Mandailing, North Sumatra, Indonesia, which is important because it demonstrates how Local Ecological Knowledge has been revived through a river protected area system.

Case Study: Reviving Local Ecological Knowledge in community based river conservation, Mandailing, North Sumatra, Indonesia.

The Lubuk Larangan (river protected area) system has been carried out by the Mandailing people in their territories (Mandailing Natal district) since the 1980s. The protected river cannot be exploited by anybody during a certain period of time (closed season), which is generally one year. At the end of that period (which usually coincides with the Islamic celebration of the end of the fasting month - Raya Idul Fitri in Bhasa Indonesian) the prohibition is lifted and the public can participate in fishing activities in the river for one day (in practice 2-3 hours), in what actually turns into a community festival. The participants pay a fee which goes to fund community development activities. The conservation monitoring is carried out by the community located close to the river and applies to all the people that interact with the river. Before the spread of the Lubuk Larangan system in the 1980s traditional conservation practices applied to rivers and forests were practised by the Mandailing and known as *rarangan* which means prohibition. These were closely interlinked with the traditional land use system, which was governed by the traditional authority.

Since Indonesian independence, however, these traditional systems have been replaced by the central government and the local forest prohibitions have been abandoned. One of the major ecological and social problems currently affecting the province of Mandailing Natal is both legal and illegal logging. Various

local communities in Mandailing restarted practising river protection in the 1980s in order to raise funds for public needs such as teachers' salaries, building of religious schools, provision of assistance to orphans and the poorest in the community, community road construction, etc. The fee collected during the fishing festival varies between Rupias 3,000,000 - 10,000,000 which goes a long way in meeting community needs. The Lubuk Larangan system has been adopted from a neighbouring province but closely resembles local practise of the past. The district government passed a decree to regulate the Lubuk Larangan system in 1988. The introduction of the Lubuk Larangan has created a spirit of cooperation and solidarity among the people and has provided economic benefit to the community, but more studies need to be done on the ecological effects. It is commonly believed that there is an increase in river biodiversity, but detailed studies have yet to be carried out (Zulkifli Lubis, Yayasan Bindu Nusantara, Sumatra, Indonesia)

Wetlands are highly productive ecosystems that provide rich biological resources for the indigenous peoples and local communities who have managed them under traditional governance and management regimes. The Ramsar Convention on Wetlands is an instrument for the protection and sustainable development of inland water ecosystems in countries in the Asia and Middle East regions, and in some cases, forms the impetus for the retention of traditional knowledge through participatory planning for wetlands management.

The Pakistani Government, in its report to the Ramsar Convention, identifies actions that have been taken to engage local communities, including indigenous peoples, in the conservation and wise use of wetlands in Pakistan. These are: Participatory Learning and Action exercises conducted on important wetlands in order to involve the local communities in the management and implementation process for the *National Action Plan for the Management of Pakistan's Wetlands;* and strengthening community-based organisations through assisting them to develop partnerships with other stakeholders (National Report for COP7 to Ramsar Convention 1999). The Netherlands Development Assistance and WWF-International are supporting the Mangrove Conservation Project in coastal areas of Sindh and Balochistan.

In Laos, Baird, from GAPE, mentions that, 'the large fish, *Boesemania microlepis*, makes a load croaking sound when it spawns in deep water pools in the mainstream Mekong River in the dry season, and in recent years local people in southern Laos have established Fish Conservation Zones in a number of areas in order to protect these fish, since their local ecological knowledge indicated that such an initiative would likely benefit the species. In fact, populations have increased since the efforts of local people first began' (Baird questionnaire 2002 cited in Ferrari n.d. unpubl. msc.).

Syria is a signatory to the Ramsar Convention on Wetlands but to date has not been active in promoting the involvement of local communities and indigenous people in the management of wetlands. The Government recognises that the relevant laws and regulations do not promote incentive programs to encourage the local stakeholders to participate in protecting wetlands but are based on the principle of

punishment and fines only. However, through its Ministry of Irrigation, Governorates, Municipalities, the Syrian Government plans to develop a participatory process for local stakeholder involvement in the development of plans for the management of the Jabour Lake Ramsar site. A project funded through the Ramsar Convention, 'Strengthening the participation of the local community in the management of Al Jaboul Lake Ramsar site' involves training staff in wetland management planning and participatory management practices, establishing contacts with representatives of key stakeholder groups in the area, and developing training workshops and awareness-raising seminars on current and potential sustainable management practices for the Lake (Ramsar 2001).

1.5 Knowledge versus practice: state of retention of traditional knowledge concerning practices relevant to the customary management, conservation and sustainable use of biological diversity that are no longer maintained or are at risk of disappearing

The capacity of indigenous peoples and local communities to live stable, productive lives in their traditional territories and harvest their natural resources to sustain themselves, without undue interference and disruption of their activities by governments or other external forces is a measure of the retention of traditional biodiversity-related knowledge. Where this is not possible, it can be assumed that traditional biodiversity-related knowledge and practices are under threat, because they are inextricably linked to the cultures and life ways of the people who employ them for their subsistence. Some complications alter this basic conclusion: generational culture shifts may be a critical factor in the loss of traditional biodiversity-related knowledge as younger generations lose interest in their cultural heritage when they move to urban centres or take up education and employment in non-traditional sectors.

Some of the pressures on traditional indigenous and local community life ways, and the implications for traditional biodiversity-related knowledge, are discussed in this section: population transfers, commoditization of natural resources and market forces, government agriculture and development programs, and the capacity of indigenous peoples and local communities to govern, control and manage their natural resources.

1.5.1 Population transfers for development projects: the implications for traditional biodiversity-related knowledge

Major infrastructure projects, such as dams that impact detrimentally on local communities through causing population transfers and disruption of traditional ways of life, and therefore diminish local ecological knowledge and practices, are but one cause of the demise of traditional knowledge systems.

The case of the community of indigenous Marsh Arabs living in the Mesopotamian Marshes of Southern Iraq is an exemplary case. Their population has been drastically reduced by the effects of major upstream damming by the Iraqi government (UNEP 2003). UNEP estimates that 40,000 people have been forced to

flee to southwest Iran and thousands more have been displaced within Iraq. It identifies that 'the impact on biodiversity has been catastrophic' and the ability of the Marsh Arabs to practice *in-situ* their traditional knowledge and 'entire way of life' has been destroyed (UNEP 2003:44).

1.5.2 Commodification of natural resources, market forces and the implications for traditional biodiversity-related knowledge

Market influences can act quickly to undermine a body of biodiversity-related knowledge. This rapid change, which is often propelled by the commodification of natural resources, can cause local populations to ignore their traditional practices, such as local traditional ways of growing, harvesting and treating plants and trees or managing animals, whether wild animals or livestock. The commodification of mango pickle in India is such a case.

In India, the people of Sagar attach religious significance to trees such as *Ficus religiosa*, Neem, *Phyllanthus embellica*, *Feicus glomerata*, *Butea monosperma*, Jack (*Atrocarpus*), Mango (*Mangifera indica*), Ashoka (*Saraca ashoka*) and Bilwa (*Aegle marmelos*). The tender leaves of mango are considered sacred, and worshipped. However, research has found that local sellers are transporting mangoes *en masse* to cities in order to be processed as industrial pickle. Moreover, tender mangoes are being harvested by cutting down their branches, straining the local plant population. As a result, the local practice of mango pickling, the technology and know-how of local pickle preparation is being lost. Kumara and Anand (1999: 29) report that:

> The younger generation is not interested in learning it because they can buy pickle on the market. Social relations are also affected: the young generation no longer interacts with the older generation in the process of pickle making. People have lost the habit of offering a gift of homemade pickle when visiting friends or relatives. Even during community gatherings industrial pickle is now commonly used.

1.5.3 Government agriculture and development programs: the implications for traditional biodiversity-related knowledge and practice

Government programs that aim to make agricultural practices efficient can cause damage to the long term relationships between local populations and environments, such as that between swidden agriculturalists and forests, and therefore, to biodiversity, as another case study shows. Vongsakid, a respondent from Laos, suggests that not enough research has been done on indigenous land-use systems, which are usually very sophisticated. He adds that 'As a result, these systems are not always well understood and documented and are often perceived as 'primitive' or even 'destructive' production patterns by government authorities, which tend to restrict such activities' (Vongsakid questionnaire 2002 cited in Ferrari n.d. unpubl. msc.). The Laotian land allocation process includes progressive aspects that in theory

should empower local people to establish and manage conservation areas. However, as Baird points out, 'the process also discourages swidden agriculture, often limiting places where upland agriculture can be practised, and advocating short fallow cycles. This can have a negative impact on both the livelihoods of local people, and biodiversity, especially when local people cannot produce enough food to eat due to these restrictions, leading them to increase hunting, fishing and other extractive activities in order to generate money to buy food to make up for shortages in rice caused by government restrictions on agriculture. Paradoxically, the government's efforts to reduce the environmental impact of shifting cultivation may often lead to increased environmental degradation through indirectly encouraging unsustainable harvesting of other various natural resources' (Baird questionnaire 2002 cited in Ferrari n.d. unpubl. msc.).

Indigenous peoples, local communities and governance of natural resources: the implications for traditional biodiversity-related knowledge

Ferrari (n.d. unpubl. msc.) provides an insightful account of how indigenous peoples and local communities in Southeast Asia have been disenfranchised of their traditional governance and management role in relation to natural resources.

> The vast majority of natural resources in most Southeast Asian countries are government-controlled. Starting with the introduction of Western land administration systems during colonial time, virtually any land that does not belong to individuals automatically belongs to the government, apart from limited examples of common customary land rights. Through the introduction of the modern state during the past two centuries, most terrestrial as well as aquatic ecosystems that were traditionally managed by local communities according to time-tested indigenous systems have come under the ownership of government agencies, with the resulting *de jure* alienation and marginalisation of the local communities.
>
> The degree to which indigenous peoples and local communities can exercise governance of their resources is subject to government priorities, business sector demands for these resources, and the strength of local organisations. The issue of indigenous and local governance and management of natural resources, and hence management of biodiversity through traditional biodiversity-related knowledge systems, is a highly political issue.

Indigenous peoples and local communities may be relatively powerless when the competitors for their natural resources are business interests with influence at the government level, particularly in the expanding forestry industries and other economic activities that contribute large amounts of export dollars to national economies. The political economy of resource management in the Southeast Asian region is determined by factors that are loom large in the developing world: the need to attract investment capital

and industries, provide employment, overcome poverty, and other worthwhile goals, that often take precedence over vulnerable, small, powerless communities whose livelihoods depend on extractable and lucrative natural resources.

Communities are claiming their rights over their traditional lands and resources, such as individual and collective cultivated plots, fallow land, common forests, watershed and wetland areas, and fishing grounds. However, in most Southeast Asian countries, Ferrari (n.d. unpubl. msc.) observes,

> …few steps have been taken to recognise the link between traditional knowledge and the need for local communities to have clear rights and responsibilities over the very resources related to that knowledge, such as land and water and the diversity of organisms thriving on and in them.

Thus, while there is increasing recognition of the important role that local communities could and should play in biodiversity sustainable management, very few governments are ready to allow local communities and indigenous peoples control over, and access to, natural resources.

1.6 Assessing the feasibility of using existing traditional knowledge to maintain customary practices relevant for the management, conservation and sustainable use of biological diversity

The outstanding examples of the use of traditional knowledge to maintain customary purposes are in China and India, particularly in relation to traditional medicines and subsistence agriculture, as relevant to the management, conservation and sustainable use of biological diversity.

Traditional Chinese medicine (TCM), and to some extent some traditional medicines of India, have been commodified for commercial purposes, and this is also the case with traditional food and medicinal substances in India, as already observed. These examples are discussed both in Part I and Part II. Nevertheless, even though traditional medicines are being produced commercially, the populations of those countries depend to a very large extent both on their uncommodified and commodified traditional food and medicines. Traditional medicines are readily available in the market because western medicines are expensive and considered to be ineffective for many ordinary ailments, such as pain and poor sexual performance. Because a traditional food or medicine is available in the marketplace does not mean that it is not used for customary purposes. In China, the Industrial Policy for 1991-2000 gives high priority to agriculture and the integration of sustainable use and production objectives for wild medicinal resources. TCM development is supported by preferential policy measures at both regional and national levels through economic and environmental planning and programming.

Where indigenous peoples and local communities have access to their natural resources where biodiversity is maintained sustainably, and where they maintain their cultural and linguistic traditions, even though undergoing rapid social and economic change, their traditional biodiversity-related

knowledge will continue to be used in some circumstances, if not all. The importance of indigenous cultures to the maintenance of biodiversity has been recognised in the literature. For example, Nietschmann makes this point eloquently:

> The vast majority of the world's biological diversity is not in gene banks, zoos, national parks, or protected areas. Most biological diversity is in landscapes and seascapes inhabited and used by local peoples, mostly indigenous, whose great collective accomplishment is to have conserved the great variety of remaining life forms, using culture, the most powerful and valuable human resource, to do so (cited in Stevens 1997:27).

The cultural dimension of knowledge retention and transmission is then the key indicator for continuing use of traditional biodiversity-related knowledge. This is discussed in throughout Part I. People become accustomed to the normal ways of doing things, as that is defined in their own society. This is true also for diet and dietary traditions, ritual traditions, particularly of the everyday variety, such as honouring ancestors and the local spirits. The resilience of culture, despite rapid social and economic change, will preserve many of the traditions of biodiversity-related knowledge systems, simply because people prefer to do things they way they have always been done.

The resilience of language and religion, each of which are fundamental cultural frameworks for perceiving and interpreting the world, will also determine the extent to which traditional biodiversity-related knowledge continues to be used for customary purposes. Muhlhausler (1996) suggests that the physical environment is an intrinsic part of traditional linguistic ecologies, in which no separation is felt to exist 'between an external reality or environment on the one hand and the description of this reality or environment on the other' (as cited in Maffi 1998:n.p.). The taxonomic systems, emic perceptions, and codified knowledge of overt and covert ethnobiological categories depend on language as a major vehicle for cultural transmission. Together with the understanding that many previously assumed 'natural' ecosystems are in fact 'cultural landscapes', and that many 'wild' plants are indeed human-modified, the role of traditional ecological knowledge and natural resource management strategies have become central to effective conservation of biodiversity. This is why community initiatives in biodiversity conservation that rely on traditional biodiversity-related knowledge are so effective.

In the dominant ideology of contemporary environmental management and biodiversity conservation in Australia, indigenous knowledge is generally dealt with as a culture-bound set of traditions or understandings whilst Western technoscience is recognized as the universal and rational objectivist framework within which managing our biological resources should proceed. In this sense, indigenous knowledges are often identified as something to 'take into account' within the existing technoscientific policy framework, rather than as a serious, legitimate, comprehensive, and workable system of sustainable environmental governance and management that has be practiced for millennia to maintain

Australia's biodiverse resources and environments.

Indigenous bodies of traditional biodiversity-related knowledge are renewed, elaborated and maintained through continuing practices of land and sea management and governance of biological resources. It is in those areas of Australia where high levels of biological integrity coincide with indigenous customary governance and knowledge systems that opportunities exist to maintain that biological integrity through strategic management regimes based on indigenous management principles and traditional biodiversity-related knowledge and practices.

There are many examples of such customary management practices being revived as loss of biodiversity occurs in indigenous territories, including both land and sea (Langton 1996; Baker, Davies & Young 2002). The following case study is an excellent example of an indigenous strategy for the maintenance of traditional biodiversity-related knowledge of the sea, or '*sea country'* to support a marine protection strategy. The strategy also aims to enable economic, social, and cultural benefits to be obtained by the indigenous people under a governance structure based on Yolngu Aboriginal customary management principles:

An *Indigenous Marine Protection Strategy for Manbuynga ga Rulyapa* (1999) developed by senior indigenous leaders of Northeast Arnhemland sets out a vision for a 'publicly endorsed and legally sanctioned marine protection strategy' for the seas called *Manbuynga ga Rulyapa* in Australia's Northern Territory (1999:1). It presents a model of Yolngu governance for sustainable use and conservation of biological resources. The Strategy is based on 'the Yolngu management principles of *djaagamirr* (land/sea managers) and *djaagamirr'* (land/sea management workers) (*ibid*). It acknowledges their authorised 'access and use of the sea in accordance with our [Yolngu] law which derives from kinship ties [*gurrutu*]'. Management responsibilities, performed under the rubric of the customary relationships of Yolngu people with '*sea country'* and its life forms, is determined by *gurrutu,* the system of kinship on which the responsibilities of ownership and custodial rights are based.

The strategies used in indigenous conservation management and planning emphasised the use of indigenous knowledge and tradition with non-indigenous expertise to achieve high-quality assessment, planning, management and monitoring. This has been the case, for instance, in commercial utilisation of plant and animal products. Development of regional plans, particularly at the catchment level in coastal north Australia, has been another important and productive strategy. Examples of such regional planning exercises include the projects of the Dhimurru Land Management Corporation in north-east Arnhemland, the Arafura Catchment Management Plan in central Arnhemland in the Northern Territory and the Alice–Mitchell basin management plan developed by the Kowanyana community in Western Cape York Peninsula. Such regional plans, based on multiple uses of landscapes, are essential for the long-term control of feral animals and plants. Because mechanical and chemical controls are limited in their

capacity to prevent outbreaks – for instance in the case of *Mimosa pigra* and *salvinia* – regional multi-land use planning and inter-agency coordination and sharing of resources are required for long-term control. In achieving conservation objectives, traditional practices alone are no match for the rapid population and development of indigenous territories by the settler state. Indigenous people and their local and regional bodies require collaborative relationships with individuals and organisations in order to meet particular, identified challenges. Success in such collaboration depends on highly qualified and experienced collaborators with a highly level of commitment to the integrity of indigenous laws. In the context of their limited ability to resist incorporation into the global economy, and increasing reliance on western technology and infrastructure, and facing a population explosion and increasing poverty and disadvantage, the challenge for indigenous groups is to find ways to share specialised management tasks in appropriate collaborative arrangements (Langton, Epworth and Sinnamon 1998:63-4).

In Bhutan, as the BAP (1997) observes, use of biodiversity resources makes a major contribution to the daily way of life of Bhutan's rural population:

> This involves plants and animals used for medicine, food, construction, fuel and other uses. There is substantial local or traditional knowledge about the resource species and their use, but there is virtually no scientific information about it. Anecdotal information indicates that the present use in many cases is not sustainable, particularly in view of the increasing population and its growing needs. Consequently, substantially more information is needed to provide guidance to assure that local people continue to receive the benefits of use, and that the use is sustainable. Long Term Objective: To assure that the rural people continue to receive the benefit of biodiversity resources through use that is sustainable.

Many other examples of the struggle of indigenous peoples and local communities to maintain customary practices and uses of traditional biodiversity-related knowledge are provided in this Report. Indigenous peoples and local communities continue their traditional biodiversity-related knowledge traditions and applications, especially in agriculture, food harvesting and herding, because they are the best options for food security and provision of other basic needs. This is the case for most rural and remote populations for whom basic subsistence activities are the predominant way of life, or significant part of their economic activities.

1.7 Summary

Human populations rely on plant genetic resources for food, and because agricultural communities dominate in the populations of the regions examined in this Report. Traditional biodiversity-related knowledge used by agriculturalists is of great significance of to food security for much of Asia and the Middle East. Traditional methods of irrigation and crop production, and maintenance of seed stock and

cultivars, have maintained food and grazing resources, and traditional water management systems have been critical to societies across all ecosystems. Humans have domesticated animals for at least the last 10,000 years, and the coexistence of human and animal populations remains typical of most small-scale, traditional agricultural and herding societies. The dependency of these societies on animal products, and indeed the dependence of the market on agriculturalists and herders to produce animal products for an ever-growing population throughout the regions discussed here must be weighed against the pressures of the global market to industrialise livestock production.

Whatever the ecosystem, and whether discussing flora, fauna or the cultural beliefs and practices of indigenous peoples and local communities of the regions studied in this Report, it is evident that a rich storehouse of traditional biodiversity related knowledge exists, that is being retained, but that it is constantly under threat. It is noted that Article 8(j) of the CBD is providing strong and critically important impetus for the retention of traditional biodiversity related knowledge among the nation states of these regions.

Along with language retention, fundamental cultural frameworks, such as religious systems, and traditional medicinal knowledge systems play a key role in the state of retention of traditional biodiversity-related knowledge systems. We draw attention to this issue because of the potential for the engagement of religious institutions in activities aimed at the maintenance of such knowledge systems. The indications are that this aspect of support for cultural institutions may be more important than generally acknowledged.

2 Identification and assessment of measures and initiatives to protect, promote and facilitate the use of traditional knowledge

2.0 Overview

Part II of this Report identifies and assesses measures and initiatives taken by countries, non-government and community based organisations in the regions of Australia, Asia and the Middle East to protect, promote and facilitate the use of traditional knowledge.

As with Part I, it has not been possible to record every example of every initiative undertaken by signatory Members and non-signatory nations under each sub-heading. There has been extensive coverage of initiatives being taken throughout Asia by agencies such as UNDP, IUCN, ASEAN and non-government projects. A number of reports by these agencies have pointed to degrees of similarity among the key responses in Asia. In such cases, a regional perspective has also been included.

The Middle East provides a set of challenges because it has been difficult to find public domain information about the promotion, protection and facilitation of the use of traditional knowledge for Part II of this Report. This survey does not assume that there has been no development of measures under CBD Article 8(j) in the Middle Eastern region. Rather, information about such initiatives is yet documented in ways that can be incorporated into a Report such as this.

Posey and Dutfield (Posey 1996; Posey and Dutfield 1996) have offered comprehensive accounts of the rights of local traditional peoples in resources and cultural and intellectual property, and the protection of such rights in the context of sustainable traditional use of resources (Langton 2002). They observe that environmental concerns increasingly focus upon the roles of indigenous peoples and local communities in enhancing and maintaining biological diversity. Detailing the provisions of each of the relevant conventions, statements and case laws that impact upon traditional peoples, they provide a wealth of knowledge for local groups wanting to pursue their rights. They must do so in the context, however, of an absence of effective measures. For instance, as Posey observes, 'The Convention on Biological Diversity does not provide specific mechanisms to protect the rights of indigenous peoples and local communities to their genetic materials, knowledge and technologies' (1996:xiii). As he points out, however, the CBD does recognise that 'knowledge, innovations and practices of indigenous peoples embodying traditional lifestyles' are central to successful *in situ* conservation. Moreover, the fundamental importance of benefit-sharing and compensation for the peoples and communities providing traditional knowledge, innovations and practices is also acknowledged. Posey's approach is to present the concept of traditional resource rights 'to guide the development of *sui generis* systems, premised on human rights principles' (1996a:xiii). The concept of traditional resource rights, he explains, is a process and a framework to develop multiple, locally appropriate systems and 'solutions' that reflect the diversity of contexts where *sui generis* systems are required.

In many cases, the present situation involves a combination of tradition, revival of customary practices, and new approaches. The circumstances throughout the region and individual countries country vary considerably from place to place, depending on various ecological and social factors. Some communities, for example are reviving traditional practices matched by new activities such as environmental education or ecotourism.

In most Southeast Asian countries, however, few steps have been taken to recognise the link between traditional knowledge and the need for local communities to have clear rights and responsibilities over the very resources related to that knowledge, such as land and water and the diversity of organisms thriving on and in them. Consequently, as seen in Part I, while there is increasing recognition of the important role that indigenous peoples and local communities could, and should, play in sustainable biodiversity management, very few governments are ready to allow the development of appropriate policy, legal and institutional reforms necessary to delegate power to local communities and indigenous peoples concerning access to, and control over natural resources. Some processes to empower local communities are taking place, but in many countries there are still many points of resistance and the gains made in one season may be cancelled back in the next one. Meanwhile, traditional biodiversity related knowledge and biodiversity resources continue to be lost.

One of the critical (and sensitive) issues in addressing biodiversity and indigenous peoples and local communities is the unequal power relation in ownership of, and access to, natural resources. Addressing unequal relations and enhancing equity therefore requires a critical look and a creative approach to power relations and the political economy of resource management in the region. In this context, many CCAs in the region have started to address conflict over resources, i.e. communities claiming their rights over their traditional lands and resources, be it individual and collective cultivated plots, fallow land, common forests, watershed and wetland areas, fishing ground, all of which are inextricably linked to the physical, cultural and spiritual lives of these people.

The issue of unequal power relations and therefore unequal access to resources and management options is not just a matter of social justice, but also one of socio-economic survival. While it is acknowledged that government efforts have reduced poverty levels, in some cases new poverty has been generated. Firstly, indigenous peoples and local communities that lose control over the resources that provide them with livelihoods are losing access to the very means of their well-being and dignity. Secondly, as environmental degradation sets in, the establishment of protected areas has often meant the eviction or resettlement of local communities, or their economic activities become very seriously curtailed. Recent reforms in conservation policy are making this happening less often now, but some cases are still occurring.

Indigenous peoples and local communities have been trying to regain at least some degree of power and

control over resources on which they depend for their livelihood and future development. They have been arguing for the need to redistribute power from the current government-business sector power centres (both national and international) to civil society, particularly indigenous peoples and local communities. Through their own efforts at the local level, and through networking at the national, regional and global level, they have been taking action to address this issue. Some of the central arguments related to their efforts to regain control and dignity are analysed in relation to identification and assessment of measures and initiatives to protect, promote and facilitate the use of traditional knowledge.

In Part II of this Report, several overarching common themes have emerged from analysis of the available sources. First, most countries have developed National Biodiversity Strategy and Action Plans (NBSAPs) to strengthen their capacity to respond to their obligations under the CBD. These NBSAPs contain elements that acknowledge, in various ways, traditional and indigenous peoples and *in situ* conservation measures that involve these peoples who retain traditional or indigenous knowledge systems. These acknowledgements are not without contradiction and represent the diversity of opinion and policy on how traditional knowledge is represented by signatory member states.

Several signatories to the CBD, including India, China, the Philippines, have taken lead roles in identifying problems and creating solutions through the implementation of innovative *sui generis* measures, including registers of traditional knowledge, seed banks and related documentation, and traditional knowledge digital libraries. Australia is developing a nationally coordinated approach that promises a development of *sui generis* measures, but as yet, no protective measures have been legislated or implemented. This is also the case with other signatories, including Bhutan, Laos PDR, Sri Lanka and Viet Nam.

Non-signatory nations covered in this Report have also followed the strategies promoted by the CBD, developing such things as NBSAPs, legal frameworks and data collection measures. Thailand, for example, has a NBSAP and has taken a leading role in its legal response to the retention of its traditional biodiversity-related knowledge. Afghanistan has strongly endorsed the need to retain its traditional knowledge but is struggling to rebuild after the devastation suffered by its people and its land during the recent wars. It has followed the framework provided by the CBD, working with NGOs to develop a NBSAP.

A second common theme is the lack of recognition provided to some ethnic groups within nation states, especially the traditional and indigenous groups for whom Article 8(j) is intended to provide protection. The survey of public domain information on the measures presented here demonstrates that a minority of these measures provide protection to indigenous peoples and local communities as the entities that retain biodiversity-related knowledge systems. Rather, it is usually the case that the interests of the nation state are the subject of measures to protect traditional knowledge, and such measures assert ownership of such

knowledge as state property and establish legislative and other systems for dealings in such property, such as patent systems, that operate to protect the national interest rather than indigenous peoples' and local communities' interests.

Australia is a special case in the region because of its settler state history. Settler peoples in Australia do not claim to be holders of traditional and indigenous knowledge systems, and therefore the Australian National Reports present a distinctly different situation from that found in the National Reports from the Asian region where national majorities can claim some legitimacy as traditional or indigenous knowledge holders. However, the dominance of settler people in the Australian polity results in Australia's responses to CBD Article 8(j) being made on behalf of the indigenous peoples of Australia. Like other responses, Australia has developed a substantial response to the CBD Article 8(j), and is moving towards measures that recognise the national interest above those of indigenous peoples, with similar minor concessions to the intellectual and cultural property rights of these groups.

As with our note of concern in relation to Asia and the Middle East in Part I, this Report also emphasises that the tendency in the Australian response to Article 8(j) to dismiss indigenous systems as viable human life ways in the expanding modern global economy poses a threat to the capacity of indigenous peoples to sustain their knowledge and resource management systems. This must be drawn attention to in future development of measures under the CBD to protect and retain traditional and indigenous biodiversity-related knowledge and natural resource management systems.

A third, and critical, common theme that emerges is the tendency in the regions examined to develop measures for the protection of traditional and indigenous biodiversity-related knowledge and resource management systems for the primary purpose of commercialising and commodifying particular aspects of traditional knowledge and related natural resources. If the potential for commercialisation becomes the key criteria for promoting, protecting and facilitating the use of traditional and indigenous knowledges, then the aspects of these knowledge systems of, for example, natural resource management that are not amenable to commodification and commercialisation will be placed in jeopardy, not least because *sui generis* protective measures will not be developed or extended to them. It must be noted that developments in India and the Philippines, such as Peoples' Biodiversity Registers, while providing the means to register, and therefore hold traditional and indigenous knowledge systems, have the potential to make them vulnerable to commercialisation, without the consent of the traditional knowledge holders. Lasimbang (2002 cited in Ferrari n.d. unpubl. msc.) writing on a case in Sabah, Malaysia, reporting that 'Over the last ten years, studies have shown that the availability of information on resources in the public domain can be a bane or a boon.' Sabah has become a centre for research on biodiversity and, according to Lasimbang 'can easily become a haven for bioprospectors.' Lasimbang (*ibid*) further reports that:

Despite the increase in information available, very little or next to nothing has been done to develop protection mechanisms for traditional knowledge and community resources. Communities have often complained about outsiders, including government departments and universities, coming in to tap resources from them without giving any information in return. Communities also complain of a lack of action from authorities when they report outsiders collecting specimens without any permit.

Lasimbang (*ibid*) makes a number of recommendations based on this case, recommendations that are relevant throughout the regions studied in this Report:

Communities rely on their tested knowledge, including customary laws, to protect their knowledge and resources from being misused. These customary laws may not be perfect because biopiracy (by outsiders) was not a common occurrence in the past. Until recently, statutory laws have been either inadequate or non-existent. The protection of traditional knowledge and biodiversity needs to be decided by communities but intellectual property policies and laws are shifting such responsibilities to governments. However, law enforcement is a major problem … Discussions on environmental sustainability should look at developing the *sui generis* protection of traditional knowledge and resources.
The development of biotechnology and potential profits from traditional knowledge on medicinal plants has resulted in trade policies that are biased towards corporations and institutes in the first world, and this has had a direct impact on WTO and national trade policies. To indigenous communities, the lack of ethical considerations with regard to biopiracy represents a critical impact as communities feel cheated and lack control. The issue also pitches communities against each other: communities who are unaware of the real motives of biopirates or are unable to turn down monetary offers are made to compete amongst each other. The discussion at the WSSD to make corporations and governments more accountable and responsible is highly relevant here.

The previously discussed common themes provide an important basis from which to identify and assess measures and initiatives to promote, protect and facilitate the use of traditional and indigenous knowledge. The measures and initiatives being instigated and supported by nation states are identified and assessed in the following sub-sections.

The sub-sections of Part II of this Report are, in many instances, artificially separated and can be seen as different lenses through which to understand the complex interplay between how indigenous peoples and local communities mobilise their knowledges in order to live their lives, how nation states are negotiating with indigenous peoples and local communities with regard to Article 8(j), and how the actions of international organisations are impacting on these communities. By example, the first sub-section considers land and sea use practices. In some cases, the development of protected areas involving land and sea use practices provide measures to preserve and maintain traditional knowledge that are supported by legislative frameworks, strategic plans, and incentive measures in addition to capacity building initiatives involving the local community. In other cases, indigenous peoples' and local communities' knowledges are marginalised as an adjunct to agricultural or riparian development within the nation state, driven by global corporate economic interests, international treaties, foreign aid donor conservation interests or a combination of such factors. Therefore, while it is possible to consider each sub-section

separately, there will be considerable overlap of issues.

Conceptually, Part II is reported within the following framework. The first sub-section, 'Land and Sea Use Practices' that protect, promote and facilitate the use of traditional knowledge, is predominantly outcomes-focussed. Nation states, in acknowledgement of their agreement to the principles of the CBD, are seeking ways to conserve rich biospheres whilst balancing a need to ensure that traditional communities can continue to sustain themselves. Given that in the regions under examination significant numbers of people rely on access to their traditional land and sea resources for survival, it is in the interests of nations to engage indigenous peoples and local communities in the task of protecting the biological diversity in their environment. Of parallel importance, there are numerous foreign aid donors that attempt in various ways to mobilise traditional biodiversity knowledge of local peoples, when that knowledge is seen to conserve the local environment.

The second sub-section, 'Incentive Measures' that protect, promote and facilitate the use of traditional knowledge, moves the focus from the reasons that traditional knowledge is being used to achieve particular outcomes, to a consideration of the measures and initiatives that nations are using to encourage traditional knowledge holders to 'bring their knowledge to the table'. This Report finds that the incentive measures being employed are predominantly linking the economic development of indigenous peoples and local communities to the mobilisation of their knowledge for the economic benefit of the nation as a whole. Such measures are seen to have much stronger conceptual links to investment and enterprise development than conservationist goals, although there are many examples where the two are mutually sustaining. This sub-section identifies and assesses the following incentive measures being used by nations to encourage indigenous peoples and local communities to share their knowledge: *sui generis* recognition of intangible property such as traditional knowledge; poverty reduction strategies, such as employment programs and the development of small scale land and sea based enterprises; benefit sharing programs; tax exemption programs; and, collaborative research partnerships, skill sharing and third party research.

The third sub-section, 'Capacity Building Measures' that protect, promote and facilitate the use of traditional knowledge, changes the focus once more. In this sub-section, it is the focus on the traditional knowledge holders themselves that is considered. For indigenous peoples and local communities to be able to take part in national strategic biodiversity planning, to take up economic development opportunities offered through incentive measures, and for them to work with national bureaucracies and foreign aid donors to maintain their customary land and sea use practices in accordance with emerging conservation and economic demands, their traditional resource rights and intellectual property rights need to be recognised. To enable equal participation of traditional knowledge holders in the above, two significant areas are identified and assessed: documentation of traditional knowledges to establish

ownership; and, broadly, the role of education in capacity building.

The fourth sub-section, 'Repatriation of objects and associated information to communities of origin' to protect, promote and facilitate the use of traditional knowledge moves the focus back to the role of the nation state. Overall, the issue of repatriation is not yet strongly linked to the CBD except in discussions about the repatriation of germplasm. If a nation state is aware of an *ex situ* collection, commonly intellectual property rights are being asserted regardless of location of the collection. Repatriation is an issue that might motivate a nation to assert its intellectual or other intangible property rights under international laws, treaties and commercial arrangements only in so far as a particular state is able to defend its claim of national ownership. It is another step removed in many cases that traditional or indigenous knowledge holders would be recognised as having *sui generis* rights either nationally or internationally. Even so, in parallel, the potential to seek repatriation of objects, biological and genetic materials, and intangible property provides opportunity for the nation to support traditional and local community assertions of property right in the global arena as an incentive measure.

The fifth sub-section, 'Strategic Planning' to protect, promote, and facilitate the use of traditional knowledge shifts the focus to an examination of National Biodiversity Action and Strategy Plans (NBSAPs) and associated planning activities that provide a central framework for all other protection, promotion and facilitation of use of traditional knowledge under the CBD. Strategic planning is strongly linked to legislative measures because it is through the NBSAPs and associated strategic planning that nation state legislation is being changed. It is through the process of formulation of the NBSAPs that national bureaucratic structures responsible for various aspects of the implementation of the CBD have engaged with indigenous peoples and local communities as traditional knowledge holders, through incentive measures and capacity building measures, to foster positive environmental and economic outcomes for the nation.

The sixth sub-section, 'Legislative Measures' to protect, promote, and facilitate the use of traditional knowledge shifts the lens to the identification and assessment of nation state legislations that are being developed to respond to the multiple requirements of the CBD and other international laws.

2.1 Regional and national land and sea use practices

The Western concept of protected areas, dating back to 1872 when the first modern protected area was established in the USA, usually focuses on spectacular biological or physiographic features for the limited purpose of conservation. This can result in a diminished role for dependent indigenous peoples and local communities in the new management regimes. For example, as discussed in Part I, the Moken people in Southern Thailand were effectively excluded from participation in land management when their traditional lands and waters were declared 'protected areas' (UNESCO/CSI, n.d.). By contrast, Saudi

Arabia has instituted a System Plan of protected areas which reconciles the conservation objective with the socio-economic imperatives by using *Hema* principles of management. *Hema* is a traditional institution for the management of the scarce natural resources, whereby the resource base is protected for regulated community use guided by a locally varying set of the rules and conventions and sanctioned by the Islamic law. The identification and prioritisation of candidate sites, representing key biodiversity features and habitat types, takes place in accordance with *Hema* principles. The System Plan thus incorporates local socio-economic factors as well as the national biodiversity conservation agenda. The *Hema* system has creatively challenged the preservationist notions of protected areas, and the Saudi Arabian Plan provides a feasible model for developing traditional conservation systems into modern protected areas (Global Development Network 2003).

Indigenous peoples and local communities who live near protected areas, while not actually within them, are potentially shut out of these special land management regimes. However, Baird (questionnaire 2002 cited in Ferrari n.d. unpubl. msc.) notes that in Laotian government has looked for ways to improve the livelihoods of local people living both within *and near* national protected areas. The government, like others in the region, has so far avoided relocating local people outside of protected areas, and officials generally allow local people to collect various types of forest products from within national conservation areas, provided that harvesting is not considered destructive.

2.1.1 Protected areas where indigenous and traditional peoples reside

The establishment of protected areas has been a key mechanism for protecting indigenous and local knowledge within national land management strategies.

In China, there is a Government-funded programme entitled ‘Construction of a Protective Forest System on the Upper Reaches of the Yangtze River’ where indigenous knowledge (medicinal plants, forest management and home-gardening) of the Qiang people is being integrated into the agro-forestry planning model. It is in part, a community income generation scheme through the sustainable production of cash crops for herbal medicines (CIRAN/MOST Best Practice example).

Jordan provides an example where protected areas are the cornerstone of the national biodiversity conservation agenda and, to date, five protected areas have been established covering over 1000 sq km. All of them have poor, subsistence communities living inside or around their boundaries. A project funded by the Global Environment Facility (GEF) aims to build national capacity in conservation and management of biodiversity in Jordan through the establishment of the Dana Wild Life Reserve. This pioneering project, implemented by the RSCN, promotes sustainable biodiversity conservation in Jordan’s protected areas through the development of community based, *market-driven* income generation and tourism programmes. The RSCN reports on this project:

> In order to address the problems between the local communities and the Dana Nature Reserve, institutional changes were instigated at two main levels: at the *site* level with the development of income generation activities for local people linked to the presence of the protected area; and at the *organisational level* with the restructuring of the RSCN to ensure that it had the capability, technically and financially, to initiate and manage community based conservation programmes (Irani and Johnson 1998).

In Australia, the House of Representatives Standing Committee on Environment, Recreation and the Arts (HoRSCERA 1993), has advocated '[using], where appropriate, the traditional knowledge and skills of Aboriginal and Torres Strait Islander Peoples in the development and implementation of management plans for protected areas' (*ibid*:67). Pursuant to this agenda, the federal EPBC Act provides for the cooperative management of protected areas held under lease by the Commonwealth. The EBPC Act recognises a role for indigenous peoples in administering the Act and three committees are established by the Act have indigenous membership (i.e. Threatened Species Scientific Committee, otherwise known as the Scientific Committee; the Biological Diversity Advisory Committee; and the Indigenous Advisory Committee). Appointment to these committees is by approval of the Minister.

In the national parks of Uluru-Kata Tjuta and Kakadu in the Northern Territory and Booderee National Park in New South Wales, traditional owners lease the land to the Commonwealth to be managed cooperatively as national parks. There is, however, some concern that the administrative structures and conventional management planning techniques used in these parks, as well as the Government imperative of developing their tourism potential, often results in the marginalisation of the indigenous owners' interests and wishes with regard to their traditional estates and land and biodiversity management practices.

Furthermore, the protected areas proclaimed by governments under the National Reserve System comprise about 6.5 per cent of Australia's land area, and do not represent all of Australia's 80 bioregions identified in the IBRA (Thackway *et al* 1996; Thackway & Cresswell 1995).

While about 15 per cent of Australia's land mass is held under a variety of statutory titles by Aboriginal and Torres Strait Islander peoples, there are other areas, especially Crown Land, to which Aboriginal people retain a special connection through descent, management and occupation and where native title may survive. To posit coastal management as an example, the *Coastal Zone Inquiry: Final Report* (Resource Assessment Commission 1993:370-76) advocates greater involvement of indigenous peoples in management of protected areas, including the establishment of ranger training programs, the development of a national policy on ownership of and access to indigenous cultural property, a review of Commonwealth heritage policy and legislation, and the adoption of a national Aboriginal and Torres Strait Islander Fisheries Strategy.

In addition, the concept of an Indigenous Protected Area (IPA) was developed in Australia as a mechanism for incorporating indigenous owned land in the National Reserve System, and in response to the need to improve the inequitable participation of indigenous peoples in conservation management. The federal government, through its agency Environment Australia, administers the Indigenous Protection Areas Program, Details about the structure and management agreements of IPAs are not entirely clear, but in general terms an IPA can be defined as an area owned by Aboriginal and/or Torres Strait Islander peoples and set aside primarily, but not exclusively, to protect its natural and cultural values (Langton *et al* 1998) The Marine Protected Areas Program operates to conserve and manage Australia's marine environment. Indigenous projects funded under this program have included a Northern Land Council project in the Arafura Sea and another in the Torres Strait (ANZECC 2001).

Other indigenous Australian institutions are rapidly developing regional environmental protection plans. For example, the Northern Land Council's Caring for Country Strategy (Taylor 1995) and the Cape York Land Council's Cape York Aboriginal Wilderness Zone each aim to provide planning mechanisms for biodiversity conservation in these respective Aboriginal domains. The Northern Land Council has established a *Caring for Country and People* Unit in its Darwin bureau with the specific purpose of providing integrated local area planning administered by Aboriginal people within its jurisdiction so that conservation strategies are coordinated by trained staff from the communities which are intended to be the recipients of the various Commonwealth and Northern Territory government agency programs in conservation (Taylor 1995).

2.1.2 Indigenous peoples' and local communities' participation in land management

Participation in land management is integral to the overall wellbeing of indigenous peoples and local communities. An IDRC project (100108) with the Karen hill tribe in Thailand proposes to investigate connections between ecosystem management under shortened-fallow shifting cultivation systems and health conditions of the Karen hill tribe people practising those systems. Indicators of ecological and health status developed under this project will be used in conducting comparative assessments of conditions in Karen villages at other points in the land transformation process, including longer-fallow shifting cultivation and both subsistence-centred and commercial-centred forms of permanent field agriculture. It is expected that the findings of this study will contribute to improved understanding of the human and environmental impact of the land use transformation process occurring in upper watersheds of northern Thailand, and will influence national indigenous land management policies.

A project funded by the Indian Government - North Eastern Region Community Resource Management Project for Upland Areas - as loan from IFAD, includes community-based biodiversity conservation. It is a seven-year project to improve the livelihood of vulnerable groups through sustainable resource

management under tribal governance.

Aboriginal communities and organisations in Australia have responded in a number of ways in asserting the need to develop traditional and contemporary forms of land/sea management for the conservation of biodiversity and the practice of indigenous knowledge for cultural and ecological sustainability. The Australian Indigenous Land Corporation (ILC) which operates under the Native Title Act 1993 to fund land acquisition and land management activities, recently produced the National indigenous Land Strategy 2001-2006 in relation to indigenous land and sea management. In 'land management' the ILC's mandate is to assist indigenous people to 'manage their lands in a sustainable way providing them with cultural, social, environmental and economic benefits' (ILC 1997:8). The ILC recognises the centrality of the indigenous relationship to land as a defining principle in setting priorities in its land acquisition and management functions (ILC c.1996, s. 3.2). The ILC may undertake land management activities on all indigenous-held land, including lands it has assisted indigenous peoples to acquire. For land to be classified as 'indigenous-held land' (ILC 1999:18), it must be held by an 'indigenous organisation' (ILC 1997:6) as defined by the Aboriginal and Torres Strait Islander Commission Act 1989. Land ownership, and support for the management of that land, is thus legitimised by the administrative category of an 'indigenous organisation'. These benefits include the employment/training of indigenous people and indigenous business development (ILC 1997:11-12). Further initiatives have arisen from the specific indigenous organisations such as the Dhimurru Corporation, in north eastern Arnhemland (Munungurritj 1992:14). Dhimurru employs a number of rangers and trains some of its members at Batchelor College in the Northern Territory. In the Cape York Peninsula, elders of the Koko Perra and neighbouring groups resident at Kowanyama have established a similar organisation, the Kowanyama Land Resource Management body (see Sharpe 1996:22-23). These elders with their expert staff have developed a management plan for the Alice-Mitchell Rivers basin and have negotiated to achieve co-operation from other bodies with the plan. This body performs the functions of a local environmental protection agency, for instance, by employing one of its own members as a senior ranger and fisheries inspection officer. At Aurukun in Western Cape York, other similar bodies have been established. In these areas, traditional land owners annually organise an indigenous Ranger Conference. Indigenous women, whilst participating in these ranger conferences, have also organised their own annual forum for knowledge sharing and generation, the Ngalmuka Land Management Conference.

In the Middle East, indigenous peoples' and local communities' knowledge has been sought in order to combat the threats posed by desertification. The Iranian Government's Forest and Range Organisation within the Ministry of Jahad and Agriculture as the nodal point of the third Thematic Program Network (TPN3) of the Asian Regional Conference on Implementation of the United Nations Convention to Combat Desertification (UNCCD). The subject of the TPN3 is rangeland management and fixation of shifting sand dunes. The project aims to develop suitable rangeland methods through action research and

capacity building. Traditional indigenous knowledge is integrated into action research and the development of rangeland systems within the project. The TPN3 recognises that indigenous knowledge of rangeland management 'is deeply rooted in the culture of local people and inherently adapted to the ecological carrying capacity of the land' (Farahpout & Marshall 2001:19).

In Indonesia, pressure has been mounting since the fall of Suharto to address indigenous peoples and local communities' demand for forest rights. A variety of civil society groups and several broad alliances have emerged with strong demands for community access to and control of forests, such as the Coalition for the Democratisation of Natural Resources (KUDETA), the Communication Forum on Community Forestry (FKKM), the Consortium for Supporting Community-Based Forest System Management (KpSHK) and the Alliance of the indigenous Peoples of the Archipelago (AMAN). Under pressure from NGOs and civil society, the Forestry Ministry, in January 1998, passed a special decree recognising the rights of communities in Krui in West Lampung to have permanent control of their forests under community management. In mid-1999, the Government engaged in a consultation exercise with NGOs in drafting a new Forestry Act. But the NGOs pulled out when it transpired that the Ministry was simultaneously drafting its own version internally. This version was eventually submitted to Parliament and ratified despite widespread objections. Another piece of law was also passed shortly after, Ministerial Decree, SK 677/1999 (revised in 2001 as SK 31/2001) which establishes a process by which communities can set up as cooperatives and secure 25 year leases to forests, subject to government approval of the local management plans. Although many NGOs are critical of the limited progress that these pieces of law represent, others are of the opinion that they represent important steps towards the recognition of community rights to manage forests (Chidley 2002).

In Laos, under the land allocation process and the Village Forestry Law, local people are allowed to establish village conservation areas, as well as 'sacred' village-protected areas related to cemeteries or places where cremation takes place. However, as Baird explains, 'recent heavy logging allowed by the government has often disrespected the rights of villagers to protect these areas, leading to logging in these areas by outsiders, much to the dissatisfaction of local people, who are now driven to think twice before investing time and resources in community conservation' (Baird questionnaire 2002 cited in Ferrari n.d. unpubl. msc.). There has also been increasing realisation that land tenure is a critical aspect of natural resource management, but it is also important to point out the issue of resource and tree tenure as they play a role in customary practices and should be appropriately considered in developing management systems. One important emerging aspect of tenure regimes is that different resources require different tenure arrangements.

In Malaysia, only in the state of Sabah there have been some pilot initiatives between the NGO Partner for Community Organisations and the Forest Department to support Community-Based Forest

Management (CBFM). This is currently slowly expanding to pilot projects in watershed management and community-based freshwater fisheries.

In Cambodia, community-based forest management has gained popularity over the years, but a major obstacle is the lack of legislation on community forestry and lack of property rights in general. Few villagers have land titles and this inhibit investment in biodiversity conservation.

Ferrari (n.d. unpubl. msc.) discusses the national policies, legislation and institutions related to resource management and community-based natural resources management in relation to forest ecosystems. He also surveys Community-Based Forest Management (CBFM), Community-Based Coastal Resource Management (CBCRM) or more generally on Community-Based Natural Resource Management (CBNRM) projects and policies. His survey shows that these have increased over the years, although most natural resources in Southeast Asian countries are still firmly in the hands of government agencies:

What is currently legally available - and only in a few countries - is access to resources thorough Community-Based Forest Agreements or similar arrangements. Although community forest management is increasingly being accepted as a valid option in the region, few countries have taken steps to develop laws and institutions to implement it. Most countries do not have policies and laws related to community forest, community fisheries and community managed coastal resources (*ibid*)

This patchy situation has led to the formation of the Forest, Trees and People Programme (FTPP). At a meeting in 2000, FTPP partners recognised the need to involve civil society more actively in community forest management and to develop more coherent networking of various local experiences. The FTPP has proposed to establish a Good Forest Governance (GFC) in Asia project in order to analyse and improve the relationships among key actors in community forest management. The GFC is a clearinghouse for best practices, lessons learned, and it also monitors the effects of wider political processes on forest governance. The program was launched in 2002 and is currently based at the Regional Community Forestry Training Centre for Asia and the Pacific, Thailand.

2.2 Incentive measures

The dependence of indigenous and traditional peoples upon natural (sometimes referred to as ‘wildlife’) resources for basic subsistence needs is often ignored in biodiversity conservation literature. This is primarily because the discourse of biodiversity protection has not typically been concerned with the protection of local knowledge of particular small-scale societies that are co-located with species targeted by conservation campaigns (Langton 2002). Langton argues that ‘With their minimal and often inaccurate understanding of indigenous societies, environmental scientists, planners and managers have the potential to cause great harm to native peoples.’ Further, she points out other weaknesses in the science-dominated approaches to biodiversity conservation:

Little regard is paid to the actual impacts of local populations; instead, unsubstantiated claims are made about presumed threats without substantial or rigorous scientific research to support such claims … Capacity-building and developing enterprise and investment strategies may well contribute to conservation goals more directly than any purely conservationist strategy aimed at national goals. Indigenous societies face increasing hardships as governments, conservation campaigners and the private sector further marginalize them.

Furze, de Lacey and Birckhead (1996:3), referring to a range of international case studies, make the point that 'many protected areas are at risk because of the hardship they place on local communities'. With the recognition that conservation often fails to achieve its goals when indigenous peoples and local communities are unsupportive, or are not meaningful partners, the question of incentives for indigenous peoples and local communities is now firmly on international conservation and sustainable development agendas. As a result, many people involved in the conservation, development and academic communities, as well as local people themselves, are involved in the search for sustainable futures.

2.2.1 Sui generis Negotiations

The first, and possibly most significant, incentive measure to support the promotion, protection and facilitation of use of traditional knowledges is the nation state recognising the *sui generis* rights of traditional knowledge holders within the legislative framework of the nation. The recognition of *sui generis* rights enables the protection of intellectual property and traditional resource rights of particular indigenous peoples and local communities in such a way as to give clear indication that the nation recognises these rights.

Posey and Dutfield (1996:79) make three important points relevant to the literature on *sui generis* and its status in this field:

Whether these national systems as they evolve will have sufficient common characteristics to enable the development of an international *sui generis* system remains to be seen. We recognise that there is continuing pressure for the establishment of an international *sui generis* system, as recently articulated by the G15 Group of developing countries.
With such a wide range of material to protect and such diverse reasons for 'protecting it', it may be that a single all-encompassing *sui generis* system of protection for traditional knowledge may be too specific and not flexible enough to accommodate local needs.
…the ability protect, promote and exploit traditional knowledge does not necessarily depend on the presence of IP rights. Bringing together, for example, local innovators and entrepreneurs may be much more relevant. Whatever measures are put in place or whatever tools are utilised, exploitation is likely to raise the profile of traditional knowledge and local innovation within communities and encourage greater involvement by younger members of the community. This is especially likely to happen if tangible economic returns are generated. However it is important to remember that not all holders of traditional knowledge would want to see their knowledge exploited in this way…For many local communities…the concept of wealth is completely

different to that found in the western world. For such communities, the imperative is to be able to ensure that their traditional knowledge and the customary laws governing it are preserved and respected, rather than to obtain monetary compensation… [There is] an unrealistic expectation among traditional knowledge holders of the possible economic value of their knowledge.

2.2.2 Poverty reduction strategies

The second incentive measure identified as poverty reduction strategies relies on the use of government monies and resources to strengthen the economic base of small, vulnerable subsistence communities who rely on their traditional knowledge to survive. Employment of indigenous and local community members in government programs is a common incentive measure to create links between conservation goals and local community economic development. In Afghanistan, for example, in the wake of recent wars, the FAO is working closely with Afghan communities through their Natural Resource CG to develop sustainable agroforestry industries and provide off-farm income and employment (FAO 2003).

There has been a significant movement in Australia over the last five to ten years with Aboriginal people asserting their rights and desire to undertake paid employment as rangers/land carers on their traditional estates. This community-based ranger initiative was supported initially through the Commonwealth Government's program, CEPANCRM. Since CEPANCRM was dismantled, indigenous organisations and communities have struggled to find recurrent funding for employment and infrastructure to develop, train and resource a ranger workforce to undertake the ongoing management of indigenous lands and seas based on traditional governance and knowledge. Despite the meagre and dispersed funding opportunities for such activities, many communities have designed innovative ways to support their personnel (albeit with often inadequate remuneration for workers) through use of community funds, small scale land/sea-based enterprises such as ecotourism ventures, and the strategic use of interim and project-based government funding sources.

2.2.3 Benefit-sharing schemes

The third example of incentive measures is the creation of government schemes that formalise access to benefit sharing between traditional knowledge holders and others who would seek to commercially exploit those knowledges. There is urgent need for research into the range of mechanisms that may be available for indigenous people to pursue the protection of their native title, and cultural intellectual property rights, especially with respect to commercial utilisation of natural products. Similarly, there is urgent need for mechanisms for the collection and distribution of royalties and other payments in the event that any of the strategies adopted for the protection of those rights are successful (Langton *et al* 1998).

In India, the Kerala Kani Samudaya Kshema Trust has developed innovative practices for benefit-sharing and intellectual property rights protection under the India NBSAP process. Anuradha (n.d.) reports that:

The Kanis' use of the fruit of a plant, identified as *Trichopus zeylanicus travancoricus*, found in the forests where they live, provided the scientists of TBGRI [the Tropical Botanical Garden and Research Institute] the lead to investigate on the same and identify its active ingredients. Thereafter TBGRI developed a drug called *Jeevani* from the same. They then resolved to share fifty percent of any commercial returns that they get from the drug with the Kanis (*ibid*: 2).

The Trust find that receives royalties maintains a register of Kani biological and cultural knowledge.

The Kerala Kani Samudaya Kshema Trust is an important case study in the use of benefit-sharing agreements, and the lessons learned from the case study are helpful for other nations investigating benefit-sharing options for the recognition of indigenous peoples' and local communities' interests in biodiversity. The joint submission of WIPO and the UNEP entitled *The Role Of Intellectual Property Rights In The Sharing Of Benefits Arising From The Use Of Biological Resources And Associated Traditional Knowledge: Selected Case Studies* (WIPO & UNEP 2000) provides some insightful comments on the success of the Kani case. Firstly, the submission identifies a need for multi-stakeholder frameworks for discussing the scope of access, value addition and benefit sharing. The administrative arrangements for distribution of trust funds must be carefully considered in light of the differing roles of local informants, tribal healers who have traditional custodianship of the relevant knowledge, and the local community more widely. Secondly, while national patent applications were pending, the licensing of the technology had already yielded a very good amount, fifty percent of which was shared with the community. The potential for abuse in the interim is evident (although in this case the scientists took a leading role in ensuring the local community received benefits). The submission reports that the scope of benefits to the Kani could have been much wider if:

- international patent applications had been filed under the Patent Cooperation Treaty, administered by WIPO, to protect the formulation in countries other than India;
- product patents were available in India for pharmaceutical products, not only process patents, and
- trademarks had been registered to protect the distinctive signs distinguishing this product from those of other undertakings.

The submission also notes that:

…the objective of the Kani Samudaya Kshema Trust to establish a biodiversity register to document the knowledge base of the Kanis must be pursued with the intellectual property implications of such a register in mind. Intellectual property questions to be resolved for the creation of such a register include who operates the register, who provides access to its contents to which parties on which terms, who conducts documentation of the knowledge, who has the right to authorize documentation on behalf of the tribes, which knowledge elements will be documented in which format, how to deal with local language documentation in relation to national and international use of the register, etc. The role of the *Plathis* as an informal association of healers which hold rights to the use of certain traditional medicinal knowledge was

not recognized by the benefit sharing arrangements in this case. Building on existing and accepted institutions of traditional knowledge holders can be an important tool to structure their participation and ensure the acceptance of the communities for benefit sharing arrangements (WIPO & UNEP 2000:49-50).

Finally, the tribal informants were not named as co-inventors in the Indian patent application. Arguably, co-authorship of patented processes would provide a practical intellectual property-based benefit sharing mechanism between traditional knowledge holders and the formal research and development institutions.

Bhutan has instituted a permit system for the collection of medicinal plants. Upon request to collect medicinal plants, the FSD issues permits on a case-by-case basis. The location for collection and quantity to be collected are to be specified in the permits. But the Biodiversity Action Plan (1997) suggests that:

…the collection of the permitted quantity is often not possible, as the required species is not available in adequate amounts. The collectors are paid on daily basis, or sometimes contracted under lump-sum agreements. It is virtually impossible, however for the scant core of technicians to reach every collection area for screening. In most cases meeting the collection target is more important for the collectors than is scientific harvesting on a sustainable basis. Lacking technical directives and proper guidelines, this is to be expected. This is the probable reason why some species have decreased by almost 50% over the past 20-25 years in localities, where they once grew abundantly' (BAP 1997:86).

The Australian NBSAP (Action 1.8.2) states that it is important to, 'Ensure the use of traditional biological knowledge in the scientific, commercial and public domains proceeds only with the cooperation and control of the traditional owners of that knowledge and ensure that the use and collection of such knowledge results in social and economic benefits to the traditional owners' (NBSAP 1995:14). The final principle states:

The close, traditional association of Australia's indigenous peoples with components of biological diversity should be recognised, as should the desirability of sharing equitable benefits arising from the innovative use of traditional knowledge of biological diversity (DEST 1996:6).

The Australian NBSAP proposes two mechanisms to help achieve this: the development of collaborative agreements to protect the use of traditional knowledge and biological diversity, including existing intellectual property rights; and, the establishment of a royalty payments system from the commercial development of products involving the use of traditional knowledge (NBSAP 1995:14).

The Commonwealth Government initiated an inquiry in 1999 to provide advice on a potential scheme to regulate access to biological resources in Commonwealth areas under the EPBC Act. This *Public Inquiry into Access to Biological Resources in Commonwealth Areas* (*'the Inquiry'*), headed by Mr. John Voumard, proposed a permit scheme as a mechanism for allowing Aboriginal owners to participate in benefit sharing of their biological resources. This scheme was to provide for a negotiated 'benefit-sharing agreement' to be struck between the applicant and Aboriginal owners or native title holders with respect to biological resources before access is granted by the Minister. Such a scheme was to apply only to

Commonwealth areas and as such does not guarantee protection or participation of Aboriginal interests in areas under native title tenure or sea estates.

The Commonwealth response to the recommendations of the Voumard Report was to develop draft Environmental *Protection and Biodiversity Conservation Amendment Regulations 2001* (Cth) ('*Draft Regulations'*) under s301 of the EPBC Act under which the proposed permit scheme is introduced. The granting of an access permit under the Draft Regulations, after the negotiation of a NBSAP, is at the discretion of the Minister for the Environment. The permit scheme does not explicitly provide for the protection of indigenous (traditional) knowledge. The terms of a NBSAP are therefore instrumental in securing the rights of Aboriginal people to benefits of the use and commercial development of biological resources. However there is no provision in the Draft Regulations for the infrastructural or administrative arrangements of Aboriginal access providers to distribute or implement monetary and non-monetary benefits. This shifts the burden of management back on the Aboriginal interests and their representative bodies as constituted under the Aboriginal Land Rights Act 1976 (Northern Territory) and the Native Title Act 1993 (Cth).

The strength of the NBSAP under the Draft Regulations resides in its flexibility and in its mandatory entry. However, due to the fact that the Draft Regulations fail to explicitly create indigenous rights to biological knowledge as intellectual property or resource rights, the negotiation of NBSAPs may not in all cases guarantee appropriate and equitable distribution of benefits for knowledge owned by indigenous peoples. The Draft Regulations are yet to be finalised.

The Australian State of Queensland is currently developing a policy on access to and use of biological and genetic resources for bio-discovery and bio-prospecting purposes; the Queensland BioAccess Policy. During the development of the Queensland BioAccess Policy, the Queensland Government will explore measures to encourage the equitable sharing of benefits arising from the utilisation of traditional knowledge, innovations and practices in relation to biological resources and bio-discovery. The Queensland Government's Code of Ethical Practice for Biotechnology Organisations in Queensland, to be released shortly. The Code will commit biotechnology organisations operating in Queensland that obtain and use traditional knowledge from indigenous persons or communities to negotiate reasonable benefit sharing arrangements with those persons or communities in the event that the knowledge contributes to successful discovery and commercialisation.

2.2.4 Tax exemptions

The fourth example of incentive measures implemented by governments in order to promote, protect and facilitate the use of traditional knowledge by indigenous and traditional knowledge holders is tax exemptions.

In Bhutan, royalties and sales taxes on the collection and sale of *lac* by local communities have been waived in order to revive traditional arts and associated activities. Furthermore, villagers in the Phontsholing can collect bamboo and cane without paying taxes or royalties, thereby encouraging the production of local items for sale and domestic use.

The Laotian tax system exempts subsistence level users of natural resources from both resource taxes and special fees on various types of natural resources. Thus, local people are able to use forest resources for subsistence, including the hunting and fishing of non-protected species. Moreover, local people are compensated for loss of customary means of livelihood.

In Japan, tax schemes and commercial product development incentives are used as a means to keep rural people on their lands and practicing their traditional (sustainable) agricultural methods. The National Strategy of Japan on Biodiversity (1995) provides incentives for local people to maintain traditional practices in Yatsuda fields, copses and waterfronts and contains a specific program to conserve Secondary Environments in Farm Villages by establishing Rural Spaces Rich in Biodiversity and Promotion of Sustainable Agriculture.

2.2.5 Encouraging collaborative research partnerships, skill-sharing and third party research

The fifth example of incentive measures implemented by governments in order to promote, protect and facilitate the use of traditional knowledge by indigenous and traditional knowledge holders is the promotion of collaborative research partnerships and skill sharing between traditional knowledge holders and other interested parties and the funding of research about indigenous and traditional knowledges by third parties.

The Australian government has a commitment to identifying appropriate incentive measures for the conservation of biodiversity through its bioregional planning approach. It has undertaken an investigation, which documents the use of incentive measures for biodiversity conservation and elaborates four case studies (see Environment Australia 1997; IUCN 2003). One of these case studies details the history and activities of Dhimurru and sets out a list of incentives which might be applied to encourage researchers and government and research institutions to undertake collaborative research that reflects the needs and aspirations of traditional knowledge holders. The *Caring for Country* community-based land management program at the Northern Land Council supports a range of joint research activities with government and other agencies (Northern Land Council 2003).

In Pakistan, the Research Institute of Chemistry at the University of Karachi initiated a program about ten years ago on the ‘Bio-prospecting of Medicinal and Food Plants: Pakistan’. Coordinated by the Institute of the University of Karachi, the project is sponsored by both the Pakistan Government and industry stakeholders. The impetus for this project is the potential contribution of bio-prospecting to sustainable

development. It aims to: 'to generate new opportunities to improve national capacities and add value to medicinal plant resources.' (Atta-ur-Rahman & Choudhary, n.d) The main investigators Atta-ur-Rahman and Choudhary identify the four main issues of bio-prospecting in the project (1) how to add value to the medicinal plant resources, (2) how to develop institutional capacities, (3) how to build skills in bio-prospecting, and (4) how to develop indigenous technology. The vision for development potential of plant resources in the project is far-reaching, as Atta-ur-Rahman and Choudhary recognise:

> These issues, if resolved, could dramatically transform Pakistan's involvement in the world economy from a raw material provider to a final product producer. Such a development would not only make full use of Pakistan's rich natural resources, but have a positive impact on the nation's economy.

However, the project investigators also recognise that there are issues stemming from this project regarding the ownership and benefit sharing of plant genetic resources. They write:

> As in most development projects, the lack of resources for bio-prospecting related to research and development work impeded the institute's efforts. During the course of many projects, it became evident that there was lack of reliable inventory of medicinal plants of Pakistan. Currently, there is no national herbal pharmacopoeia, herbarium of economic plants and ethnobotanic data in Pakistan. It is difficult to find suitable commercial partners because industries based on indigenous R&D do not exist in Pakistan. There is also no clear policy on profit sharing, intellectual property rights and other potential relevant legislation. Nongovernmental organizations, moreover, are not fully prepared to handle issues related to bio-prospecting and benefit sharing (*ibid*).

In Jordan, there is a collaborative research partnership being developed between the Jordan Aridlands Research Centre and Arizona State University: 'Using remote sensing and indigenous knowledge for management of ephemeral water' (Patrick 2003)**.** The web site details a case study of scientists collaborating with local shepherds to identify sources of water, using traditional knowledge and remote sensing materials and techniques, while recognising traditional water harvesting as crucial to management of arid environments in Jordan.

In 1994, Syria established a Centre for Scientific and Environmental Studies which may provide support for the development of stronger mechanisms to protect local knowledges and practices in relation to biological resources. In the last year, Iran has conducted a consultation workshop, a national seminar study, and contributed to a publication entitled 'Biodiversity and Traditional Knowledge: A glance on practical methods of protection of traditional knowledge for conservation and sustainable use of biological diversity' (Iranian questionnaire response).

2.3 Capacity-building measures

Capacity-building measures that protect, promote and facilitate the use of traditional knowledge commonly focus on the traditional knowledge holders themselves. For example, in Australia, indigenous people in their Native title claims and non-claim based negotiations with a range of authorities, including

the Wet Tropics Management Authority, the Great Barrier Reef Marine Park Authority, fishing industry and rural industry groups, and government bodies demonstrate the desire for real participation in management and planning of the environment projects subject to cross-governmental and cross-sectoral arrangements.

To enable equal participation of traditional knowledge holders in all agreements and contracts with outside parties, two significant areas of capacity building are identified and assessed: documentation of traditional knowledges to establish ownership; and, broadly, education initiatives that enhance local community capacity to engage actively in the promotion, protection and facilitation of use of their traditional knowledge.

2.3.1 Establishing ownership of traditional knowledge through documentation

The documentation of traditional and indigenous knowledges, as noted in Part I, is one of the foundations of the capacity of traditional knowledge holders to promote, protect and facilitate the proper use of their knowledge. Accurate documentation also enables nations and other interested parties to enter into agreements and contracts with traditional knowledge holders that will strengthen the capacity of these communities to develop economically sustainable livelihoods. As noted in Part I, there is a rapidly growing body of knowledge and literature on the recognition and protection of the knowledge, innovations and practices of indigenous peoples and local communities relevant to the conservation and sustainable use of biodiversity that can be described as diverse, and highly accessible. As discussed, there are significant gaps in this literature.

The importance of the literature in these fields cannot be underestimated; the issue of sound documentation lies at the heart of the problem of recognising, protecting and maintaining the knowledge, innovations and practices of indigenous peoples and local communities relevant to the capacity of a community to undertake conservation and sustainable use of biodiversity. The threats to traditional knowledge and practices include not only those that threaten subsistence and traditional lifestyles, such as large-scale economic and commercial developments, (militarization, agro-industrial cropping and forestry, etc) and associated population removals, land dispossession and urbanisation of subject populations, but also biopiracy, misappropriation and unauthorised commercialisation of traditional knowledge, practices and resources. A community cannot build its capacity to mobilise its knowledge if there is no recognition that it is owned by them.

As noted earlier, Posey observes ‘The nature of traditional knowledge is such that more of its transmitted orally than written down,’ and thus there are particular problems when parties not authorised by the holder of that knowledge seek to obtain intellectual property rights (IPRs) over it: ‘In the absence of any accessible written record, a patent examiner in another country is unable to access documentation that

would challenge the novelty or inventiveness of an application based on traditional knowledge…it is extremely difficult and costly for developing countries to monitor and challenge IPRs issued all around the world' (Posey 1996:81). A range of intellectual property tools have been adopted by a number of countries to promote and protect traditional knowledge and folklore, including specific IPRs (Posey 1996:70; see also WIPO 2002; WHO 2000). Some countries have recognised that the existing intellectual property system is not, on its own, adequate to protect traditional knowledge. A number of these have enacted or are in the process of enacting *sui generis* systems of protection, including the Philippines and Bangladesh (Posey 1996:79).

The range of existing and potential protective measures for traditional knowledge and practice systems, then, depend on sound documentation in order to describe and catalogue the elements of local systems for the purposes of *sui generis* and other protective measures and for their preservation and protection for the members of those societies in which they originate. Such protective measures, *sui generis* and otherwise, include for instance, digital libraries and registers.

Posey (1996:82) contend that patent applications claiming traditional knowledge already in the public domain should not be granted. However, they acknowledge that

> The problem is that the knowledge tends not to be documented, or if it is, it is unlikely to be easily accessible to a patent examiner. In particular, information on traditional knowledge is not likely to be found in the type of patent-based information that patent offices rely most on when assessing novelty and inventiveness.

To address this problem WIPO and a number of developing countries led by India and China are seeking to develop traditional knowledge digital libraries which will detail considerable amounts of traditional knowledge already in the public domain in forms accessible to patent examiners, such as the WIPO International Patent Classification (IPC) system.

As noted in Part I, the relevance of traditional knowledge and practice to the vast geographical areas of the regions discussed in this study and the importance of traditional knowledge to the natural resource management, agricultural and pastoral lifestyles, medicinal and other social and economic needs of most rural populations in these regions means that the task of documenting traditional knowledge and practices is unachievable in the short term. Even so, documentation is central to the capacity of indigenous peoples and local communities to protect their knowledge.

2.3.1.1 Libraries, databases and registers

Traditional knowledge digital libraries have been the subject of deliberations by a WIPO specialised Task Force including representatives from China, India, the USPTO, and the EPO, examining how such libraries can be integrated into the existing search tools used by patent offices (Posey and Dutfield

1998:81).As discussed in Part I, there are three examples being developed by WIPO signatories, the TCM in China and the TKDL and the PBRs in India. The government of the Lao People's Democratic Republic, as noted in Part I, has also established the Traditional Medicines Resource Centre.

In its Second National Report on the CBD (2001:37-8), India addressed the initiatives it has undertaken further to the original Traditional Knowledge Digital Library (TDKL) initiative. These are well-advanced and represent world best practice both in terms of the extent of documentation and protection provided for traditional knowledge systems:

In the recent past, there have been several cases of biopiracy of traditional knowledge use of biological resources from India. First it was the patent on wound healing properties of *haldi* (turmeric); now patents have been obtained in other countries on hypoglycaemic properties of *karela* (bitter gourd), and *brinjal*. These uses have been an integral part of traditional system of medicine in India. India had challenged the patent on *haldi* and, because it was proved that this property is documented, it is not novel and, is prior art, the patent on turmeric was revoked. Similarly the patent on fungicidal properties of *neem* was revoked by the European Union. In this background, India has now initiated an exercise to prepare easily navigable electronic computerised database of documented traditional knowledge relating to use of medicinal and other plants. India's efforts in this regard have been appreciated and in the last meeting of the Committee of Experts of the International Patent Classification (IPC) Union held in February 2001 and the IPC Union has agreed to set up a Task Force on the Traditional Knowledge Resources Classification.

Documentation of traditional biodiversity related knowledge on the status, uses and management of biological resources constitutes the People's Biodiversity Registers (PBRs). People, as part of their daily subsistence activities, have acquired knowledge about the use of a variety of biological resources, for example as graziers, as fisherfolk, as basket weavers. The information is almost exclusively orally transmitted. PBRs are an attempt to document such knowledge. PBRs envisage the creation of decentralised country-wide database on status of biological resources. They also include local knowledge on properties and uses of biodiversity resources, for example, drought resistance of certain varieties, methods of preservation of foods, or use of certain plants in treating human or livestock diseases. In India, preparation of village-wise People's Biodiversity Registers for documenting knowledge, innovations and practices has been undertaken in a few States. The State Plan for Kerala has also actively promoted documentation of local knowledge regarding biodiversity in people's biodiversity registers. One pilot project on this has been completed in Ernakulam District. Two other projects at Panchayat level have been initiated by the Tropical Botanic Garden and Research Institute and the Kerala Forest Research Institute. In Himachal Pradesh, the State Council for Science, Technology and Environment has prepared a PBR for the Mehli village. The state of Karnataka presents a unique example of NGO initiatives in the

formulation of a PBR. Some experts who were part of the State Planning Board recommended the Karnataka Biodiversity Conservation Order in 1996. This order envisaged biodiversity boards at the state and sub-state levels, with a wide range of stakeholders being members of the board, and envisaged PBRs as part of the responsibilities of the boards. One of the organised and widespread attempts of NGOs has been towards initiating and completing PBRs.

The Centre for Ecological Sciences, Indian Institute of Science, Bangalore by mid 1998, had established 75 Peoples' Biodiversity Registers. Gene Campaign has undertaken work on documentation of biodiversity and knowledge relating thereto among three tribal populations: the Munnars in South Bihar (in the Chotanagpur region); the Bhils of Madhya Pradesh; and the Tharus of the Terai region. Medicinal plants and knowledge related thereto was sought to be documented with the help of educated tribal youth. Elders in the village, medical practitioners and traditional healers were consulted in the collection and understanding of the information.

The Research Foundation of Science, Technology and Ecology (RFSTE) initiated a movement called the Jaiv Panchayat: Living Democracy in early 1999. According to the RFSTE, the Jaiv Panchayat movement aims to establish definitive sovereignty of local communities on their biodiversity resources. Activists from RFSTE and Navdanya have been interacting with local villagers in different parts of India to constitute informal community level institutions called Jaiv Panchayats comprising of volunteers from a village. The members of the Jaiv Panchayat are entrusted with the task of inquiring and recording information on biological resources, and various uses of the same in the form of Community Biodiversity Registers.

In 1995, Kalpavriksh and the Beej Bachao Aandolan (Save the Seeds Campaign), in collaboration with the villagers in Jardhar of the Teri Garhwal district of Uttar Pradesh, initiated an exercise to document the various bio-resources used by the community and their conservation practices. The members of the Beej Bachao Aandolan, a network of local farmers who have been involved for a number of years now in reviving and spreading indigenous crop diversity, actively collaborated with the Kalpavriksh members. By mutual agreement between Kalpavriksh and the villagers, it was decided that a copy of the register will be kept in the village and another copy would be kept by Kalpavriksh, and that all the information in the register can be used and distributed only with the consent and knowledge of the villagers.

The Honey Bee Network is a knowledge Centre/Network pooling solutions by people from different sectors throughout the country and the world. Honey Bee has collected over 10,000 examples of contemporary innovations and outstanding examples of the use of traditional local knowledge in the sustainable management of natural and other resources. These innovations are shared with local communities and individuals within India and in 75 other countries through the Honey Bee newsletter which is published in eight different languages (English, Spanish, Hindi, Gujarati, Tamil, Kannada,

Pahari and Telugu). SRISTI (Society for Research and Initiatives for Sustainable Technologies and Institutions), a NGO based in Ahmedabad, India, set up in 1993 to essentially sustain Honey Bee Newsletter and associated research and action activities. SRISTI supports Honey Bee Network by linking six 'Es' – ethics, equity, excellence, environment, education and efficiency in enterprise.

The Honey Bee Network has created new standards of accountability and ethics in dealing with grassroots innovations by strengthening people to people learning. The formal sector cannot use the traditional knowledge in the Newsletter without acknowledgement, citation and prior informed consent of the knowledge holder. The Honey Bee supported the concept of Prior Informed Consent much before the CBD came into existence. The Honey Bee Network approach promotes that for innovations in one part of the world, investments are made in the other. The Honey Bee data base with thousands of innovations is being upgraded to multimedia capabilities. This will ensure that barriers of languages, literacy and localism can be overcome to connect innovators, potential entrepreneurs and investors across regions. The idea is that through using electronic, textual and oral media, a multilevel network can be put in place to support the documentation, experimentation and reward, both in material and non-material form of individual and collective grassroots innovations.

In the management of agrobiodiversity, the NBSAP for Lebanon identifies the Government's mid-term goal to establish traditional farms to maintain and propagate traditional or 'heritage' plant varieties. It states that the government 'should recognise the rights of farmers…to benefit from, to share and to further develop germplasm, as well as the right to refuse appropriation and commercialisation'(NBSAP 1998:19). An Objective of the NBSAP is to 'establish a national agrobiodiversity database to document it as part of the 'national natural heritage' (NBSAP 1998:22).

In Viet Nam, CIRAN/MOST record this example in their 'Best Practices in Indigenous Knowledge' involving what has been called an 'Ethnic Minority Development Data System (EMDDS)' (B.P 23). The Ethnic Minority Development Data System is based on a philosophy of mutual respect between indigenous peoples and government officials, and is intended to replace conventional ethnic minority classification surveys. Although one of the objectives is data collection (on location/geography; socio-cultural factors and services; food and income production; land/water/natural resources; access to information), the major objective is to use more participatory and equitable methods in order to increase community-government dialogue and mutual understanding. Agencies provide a format for the data to be collected from communities, but indigenous peoples and local communities are nevertheless free to submit data they want others to know about, especially the government. Therefore a category has been added: 'locally determined input'. A sub-category, 'ethnic resources', has also been added to the category 'socio-cultural'.

The purpose of the data collection, on-site analysis and review is:

- to establish or improve dialogue and understanding between indigenous peoples and governments;
- to collect and analyze data of value to both;
- to use the data—in the case of communities, as a basis for decision-making and planning their own lives, and in the case of government, for determining the content of development activities and the approach that is taken; and
- to generate a pool of accurate quantitative and qualitative data for use in policy-making. For example, the joint data collection and review based on the philosophy of mutual respect results in information, maps, ideas and analyses that villagers use as a basis for drafting development plans.

EMDDS is being developed by the Committee for Ethnic Minorities and Mountainous Areas (CEMMA) and the Institute of Ethnology. It involves a flexible mix of external participatory techniques and indigenous communication systems. Initial trials have resulted in smiles on villagers' faces and interest on the part of many government officials. Besides requiring the collection of data on indigenous knowledge, skills, practices and other resources, EMDDS encourages the people themselves to contribute the indigenous knowledge input.

The following is an example of this:

THEMES:
COMMUNICATION, ETHNIC MINORITIES, DATA COLLECTING, CLASSIFICATION

COUNTRY: VIET NAM
Regions: North, Central Highlands

INDIGENOUS ASPECTS

In EMDDS, indigenous knowledge does not simply add an extra dimension; it is the foundation for community-government contacts and mutual cooperation based on respect. Without this respect and continuing exchange there is little opportunity for constructive development.

SUSTAINABILITY

The mutual respect and understanding created by the practice should result in growing cooperation.

STAKEHOLDERS AND BENEFICIARIES

Community members and government agencies have a stake in the project and benefit from it. During the trial period in 1998, 12 indigenous communities, one ministry and one research institute were taking part in the project.

STRENGTHS

- As mutual trust increases, cooperation improves.

- The data are more accurate and complete.

- The indigenous population takes part in development decision-making.

WEAKNESSES:

Official approval might be difficult to obtain because the government will fear a loss of authority and control. The project might require more resources (funds, time and effort) than are available. As data collection progresses, community members and local officials will make use of the feedback and add

more and more of their own inquiries for strategic purposes. It is therefore vital that the research institute maintain some control over the database, monitor the activities, and draw the links.

It is vital that the project budget allow for teaching local people to manage and update the database. The activity must be embedded in the community and not left to the state. These kinds of inquiries will gradually become part of people's lives, and they will use the data for many other activities.

IT IS CONSIDERED SUCCESSFUL BECAUSE:

It is too early to measure the success of the practice. Thus far only the development stage has been successful. Trials have now been conducted in four provinces (12 villages) by a joint team of resident villagers, government officials (mainly to learn), and the Institute of Ethnology (which is quite skilled in this approach). The trials involved approximately 2-3 days per village (staying overnight), which is the maximum you could expect government officials to invest in such work.

The positive results were reflected in: (1) the eyes and smiles of the villagers, who finally had a chance to talk and educate outsiders, (2) the interest and acceptance shown by the participating officials and by the high-ranking officials who heard about the practice later in workshops, and (3) the decision by CEMMA (the ministerial body governing indigenous development) to integrate these methods into on-going policy studies and other efforts.

The negative results were reflected in the lack of interest on the part of some district and provincial officials, who refused even to take part in a trial. Apparently they found it too risky. A strange new system which respects indigenous knowledge and skills might demand more of their time and resources, and of course it contradicts the top-down methods of the preceding decades.

Nevertheless, the chances of the practice succeeding appear to be good, because the Institute of Ethnology is quite skilled, CEMMA is committed, and the indigenous people who have been involved up to now are optimistic.

POTENTIAL FOR REPLICATION

In principle, the practice should be easy to replicate. For the EMDDS itself, the main obstacle to further replication could occur after 1999, when the data system becomes institutionalized.

There are many networks in Asia that promote this kind of process. Communities and local professionals should be encouraged to establish contact with these networks to find out what other people are doing. Government officials should be encouraged to link the findings with the results of other research in the region. This would also help the process to take root.

The *Mekong Aquabase* is a Mekong River Project (Viet Nam, Cambodia, Thailand, China, and Myanmar). In part, it comprises a GIS-supported integrated local-scientific knowledge base of a participatory decision support system for resource and environmental management of the Mekong basin for sustainable livelihoods development of the riparian communities. This work is drawn substantially from the PhD of Ataur Rahman (Rahman 2002). The website provides a large amount of information on this project that Rahman calls a Decision Support System (DSS). This site is also linked to a knowledge base site and a searchable knowledge cluster.

2.3.1.2 Inventories

Inventories and enumerations of species compiled by governments and scientific bodies form a significant

and important category of literature, and within this body of literature are inventories of critical importance to the challenge of recognising and protecting traditional knowledge.

For example, in the CBD Second National Report of His Majesty's Government of Nepal, among the documents listed to demonstrate progress made to produce the national biodiversity strategy and action plan, reference is made to the 'National Register of Medicinal Plants' (HMG/IUCN 2000).

Inventories can serve purposes beyond evidence of innovation for patenting. They can significantly contribute to capacity building measures. They can demonstrate the relationship between traditional knowledge and conservation of biodiversity, as Ferrari (n.d. unpubl. msc.), writing for the IUCN Theme on indigenous/Local Communities, Equity, and Protected Areas TILCEPA (a working group established jointly by the World Commission on Protected Areas and the Commission on Environmental, Economic and Social Policy), shows in a case from North-West Thailand:

The WWF-led Thung Yai Ecology Project in North-West Thailand pointed out great richness and depth of local ecological knowledge (local ecological knowledge) of the Karen people in the Thung Yai Wildlife Sanctuary. While the Karen have been threatened with eviction from the sanctuary by the Royal Forestry Department (RFD), this ethnoecological project documented that the local ecological knowledge of the Karen recognises at least 41 different vegetation communities and habitat types (without counting micro-habitats) and interprets the landscape of the sanctuary as one complex and 'interacting mosaic', understanding the importance of this mosaic as an ecological support system for both the people and wildlife populations' (Steinmetz 1999).

Iran, in its national actions towards combating desertification, has promoted the use of new technologies and techniques relating to combating desertification and better use of indigenous knowledge and technologies. An inventory of such technologies and knowledge has been prepared and reported to COP 1 of UNCCD and reflected in Iran's Reports to the Parties of the Convention of the UNCCD (1997).

Lebanon has developed a Sustainable Use of Dryland Agro-biodiversity project (funded by UNDP/GEF) promoting on-farm conservation management of crops and cultivars and has used eco-botanical surveys, vegetation surveys and indigenous knowledge surveys.

2.3.1.3 Web Portals and Web Libraries

Although, there is a growing body of information on traditional knowledge on the Internet, as WIPO has observed, much of it is not in a form that would make it either searchable or useable by patent examiners (WIPO 2002). The web portals and libraries allow, however, for accessibility to, and sharing of knowledge and research outcomes among the world-wide community of experts, practitioners and others engaged in the documentation and protection of traditional ecological knowledge.

The principal web portals and web libraries are described below and URLs provided:

- Indigenous Knowledge and Development Monitor (IKDM) and Indigenous Knowledge and Development Network

The international Indigenous Knowledge and Development Network consists of more than 2500 participants in 106 countries world-wide. It aims to facilitate the growing number of formally established indigenous knowledge resource centres. It acts as a forum for discussing issues associated with indigenous knowledge systems and traditional ecological knowledge. It aims to promote the use of indigenous knowledge as complementary to the scientific tradition; to expedite the obligations of States to support IKS under provisions contained in Agenda 21, the Biodiversity Convention, and other international agreements and conventions applying to indigenous peoples; to work for protection of indigenous knowledge and just compensation to communities for their knowledge.

Information products include:

(a) Membership database contains information on expertise of participants. Covers some 3000 persons from 120 countries. Dates from 1993 to date. Hosted by CIRAN / NUFFIC at http://www.nuffic.nl/ciran/ikdm/

(b) Indigenous Knowledge and Development Monitor (IKDM): print journal, some back issues available in full text on the NUFFIC website at http://www.nuffic.nl/

(c) Members also contribute to the supervision on the Indknow discussion list at http://www.nuffic.nl/ik-pages/ik-network.html

- SciDev.Net

SciDev.Net hosts an Indigenous Knowledge Dossier and is sponsored by *Nature and Science* in association with the Third World Academy of Sciences. It is published with the financial support of the UK Department for International Development, the Swedish International Development Cooperation Agency, and the International Development Research Centre in Ottawa, Canada, at http://www.scidev.net

- World Bank's Indigenous Knowledge Gateway

The World Bank hosts an Indigenous Knowledge Gateway as part of its Development Gateway Portals. The Gateway, together with numerous others, gathers information from all over the world to facilitate the dissemination of information and best practice examples at http://www.developmentgateway.com

The reader is also directed to an extensive list of general and country specific websites listed in the References section of this document.

2.3.2 Education initiatives that enhance local community capacity to engage actively in the promotion, protection and facilitation of use of their traditional knowledge

2.3.2.1 The role of adult education in capacity building

Education is employed in two ways to support capacity building measures in indigenous and local communities. Firstly, there are community-based adult education programs that undertake a variety of activities: for example, working with local communities to protect, promote and facilitate the use of their knowledge for conservation and/or economic purposes, and enabling the transfer new knowledge and skills to indigenous and local peoples. Sometimes these education activities, also called community capacity building programs, draw on documented traditional knowledge, and sometimes the activity itself seeks to document and register these knowledges.

For example, the government of Viet Nam has identified three broad strategies for attacking poverty that link directly to capacity building measures to protect, promote and facilitate the use of traditional knowledge: the creation of opportunities for employment and increased productivity; measures to ensure that growth is fair and equitable; and measures to reduce the vulnerability of the poor. The first phase of this project demonstrated that community- based natural resource management (CBNRM) concepts and processes, such as 'farmer-to-farmer' methods, can be successful in reducing poverty at the commune level. This phase will attempt to extend the methods and processes applied in Hong Ha Commune to a larger number of communes in A. Luoi District, Thua Thein Hue Province. The overall goal is to develop and support processes that will reach, empower and build sustainable livelihood options for a greater number of the poorest of the poor in upland communities. The approach involves drawing regular government agencies into CBNRM and building their capacity to adopt participatory methods. (IDRC Project 100876, Community-Based Upland Natural Resources Management Viet Nam, Phase III).

In Afghanistan, the Future *Harvest Consortium to Rebuild Agriculture in Afghanistan* is a collaborative project funded by the United States Agency for International Development and implemented by the International Centre for Agricultural Research in Dry Areas. It aims to reinstate Afghanistan's agricultural base by assisting local communities to produce sustainable crops and rural industries after 23 years of war and four years of drought (ICARDA 2002). Seed for crops was procured from Afghan farmers and cleaned by workers using methods that go back thousands of years. Following recent looting of the Afghani national seed bank, the consortium is re-assembling traditional farmer varieties of barley, chickpeas, lentils and forage crops in its efforts to reconstitute a collection of the country's plant genetic resources (Future Harvest website 2002).

In Australia, ATSIC in its recent submission to the Commonwealth Inquiry into Access to Biological Resources in Commonwealth Areas makes comprehensive recommendations regarding the capacity for indigenous communities to maintain control over access to and use of their knowledges in the conservation of biodiversity including the establishment of community and national registers of traditional knowledge, an indigenous biodiversity trust and the provision of legal and technical support to indigenous communities and institutions to formulate appropriate mechanisms and instruments for their

involvement in decision-making (Fourmile 2000).

In Cambodia, in relation to capacity building in communities that are seeking to conserve their forests, Ferrari (n.d. unpubl. msc.) provides an example involving NGO support in Kampong Speu province in Cambodia:

A case study related to NGO support to a local community is that of Mlup Baitong in Chambok Commune, Kampong Speu province, partly situated within the Kirirom National Park. The park, with an area of 35,000 hectares, is one of the 7 national parks of Cambodia. In the 1950s and 60s it was a tourist area/hill station for wealthier people from Phnom Penh. The Khmer Rouge took control of the area in the 1970s and the security situation was not stable until the mid-1990s. Kirirom National Park was established in 1993 under a Royal Decree by King Norodom Sihanouk, which formally established the country's system of protected areas. The area is not known for its wildlife, which have mostly been hunted out, but it is famous for its native pine forest (*pinus merkusii*) of approximately 8,000 ha and cool mountain climate. Because of the mixed forest types, there are many species of birds in the Park (183 species recorded). Mlup Baitong is a Cambodian NGO that has been helping the local community of Chambok Commune, Kampong Speu province, to think about improving skills to deal with tourists visiting their area (part of which is in the Kirirom National Park). The villagers, living in nine villages of ethnic Khmer people (approximately 2,500 people), with Mlup Baitong's assistance, have so far secured a permission from the Ministry of Environment to establish a conservation zone and are now developing an eco-tourism project. As Bradley, Mlup Baitong's director explains, 'It all started at the end of 2001 with education and awareness raising, and participatory approach to developing a management plan for the local resources. Initial activities such as community patrols of the forest resources have started, so the forest is already benefiting from it. There is also a growing feeling that local people can now better express their ideas, thereby strengthening the community both internally and in dealing with external agencies' (Bradley questionnaire 2002, cited in Ferrari *ibid*).

As part of the Philippines Marine Protected Areas Project (IDRC-SUB, 2002), the Project team works with fishers to undertake management research, modify fishing practices, take proactive measures for marine conservation, improve local organizational and leadership capacity, provide environmental education, develop alternative livelihood options, and establish marine protected areas to safeguard habitat and manage exploitation. Another project is the *Project Seahorse* (1999), conducted by researchers from McGill University, Canada.

In Oman, the specific fisheries management objectives for the Sultanate of Oman include: ‘Use traditional knowledge and interests of artisanal fishermen and communities in fisheries management’ (The Directorate General of Fisheries Resources Oman 2001). The Omani Government recognises fishing as a deep-rooted Omani tradition. Through its Ministry of Agriculture and Fisheries, the Government has established a Fisheries Training Institute to develop the capacity of rural youth to participate in the modern fisheries sector. This involves building on traditional knowledge of fishing families and augmenting employment and production through the integration of modern technologies and techniques with traditional practices (Feidi 2002).

The Orissa Tribal Empowerment and Livelihoods Programme is a programme funded by Indian Government as loan from IFAD (USD 91.2 mill). This project reflects Government priorities to enable community capacity through use of local/indigenous knowledges and innovations to develop contemporary governance and development programmes for improved livelihoods. The focus on community capacity building in one of the poorest regions in India is designed for poverty alleviation and strengthening of institutional capacity of government institutions. NGOs, through programme interventions, built on indigenous knowledges and other technologies. Indigenous governance will guide the emergent local policy environment (IFAD 2001).

UNDP and the Government of Yemen are engaged in several programs to build the capacity of local communities to participate in the conservation and sustainable management of natural resources. In 2002, they undertook a project, the national 'Sustainable Environmental Management Program' that aimed to build the capacities of government and research institutions, NGOs and local communities in biodiversity conservation. Capacity building measures included training and support to forty local communities through 170 projects in water harvesting and soil reservation; establishment of eco-tourism department and genetic resources unit; draft eco tourism strategy; draft forestry and eco-tourism laws; public awareness activities and technical studies. Another project, the 'Catalytic Support for the Implementation of the National Action Programme to Combat Desertification', seeks to build institutional capacities both at /the national and local levels for: mainstreaming drylands. issues into sector strategies and policy frameworks; strengthening local governance for natural resources management; mobilizing funding for drylands development priorities; and promoting co-operation and knowledge networking for drylands development in the Arab Region (UNDP 2003).

A project supported by the Indigenous Knowledge for Development Program of the World Bank is integrating innovations and applications of traditional knowledge into the training of farmers and farming curricula as part of the reclamation of Sodic Lands. This World Bank-supported project aims to increase farm productivity through combining indigenous and scientific knowledges to improve crop yields by 60%. These innovations in traditional knowledge are taught in the curricula of a local farmers' training institution (Gorjestani 2000).

In Viet Nam, a Community-Based Upland Resource Management Viet Nam (IDRC Project 040020) has been conducted. The research was carried out in Xuan Loc commune, home to two ethnic groups. The minority Vankieu practice shifting cultivation while the majority Kinh (lowlander) depend on forest resources and wetland rice. Deforestation was occurring rapidly for a number of reasons, including population pressure and government logging activity. The project began with a 2-week training course on participatory rural appraisal. The participants in the course included six researchers, two key district officials and 10 villagers. This provided an opportunity for both outsiders and villagers to get to know one

another. An interdisciplinary team of researchers were trained in the community-based approach and cooperated closely with local organizations (farmers' association, gardeners' association, women's union, etc.).

Together, they identified production options to improve livelihoods. These included procuring high-quality seed of new varieties of rice; planting improved corn varieties where there was not enough water for rice; increasing pig production by establishing a revolving credit scheme managed by the women's union; feeding pigs on cassava silage; and improving home gardens. Appropriate training courses were provided along with all these interventions, and one villager received a month's training in veterinary care. The villagers benefited directly from all these interventions in terms of improved food and income security: rice yields alone increased from 2.6 to 3.8 tons/ha over 3 years. They also demonstrated an improved ability to analyse their problems, assess their potential and take steps to fulfil their needs. The researchers increased their understanding of community-based natural resource management. On the other hand, it was noted that although the villagers participated in government replanting schemes, they continued to use protected and reserve forests in an unsustainable manner.

Work continued in Phase II Community-Based Upland Resource Management Phase 2 (IDRC Project 040405). Although Kado village and the small watershed associated with it will continue as the study site, swidden agricultural systems as practiced by the minority Chil group will be the main focus in this phase. Participatory research and development methods will be further promoted. Appropriate and gender-sensitive measures to help swidden farmers attain their food, income and natural resource management goals will be sought.

Another project, the Natural Resources Management Network Viet Nam (IDRC Project 040326) has also been established. Under ‘doi moi’ (a market-oriented development policy), Vietnam's economy grew by 9.5% in 1995. However, five years of rapid expansion has thrown the economy out of balance. Foreign investment has soared and cities prosper but this new wealth has yet to reach the vast and desperately poor countryside. Under such conditions poorer farmers and their families often exploit open access resources or clear forests to settle new agricultural areas.

Under an earlier project (91-0133), a network of researchers at nine institutions sought to improve rural incomes and livelihoods, using farming systems research and extension methods, based on a strategy of farm diversification in six major agro-ecological zones. This project extends and broadens that work into the field of natural resource management using community-based participatory research management methods. The general objectives of the project are to develop human resource capabilities in community-based natural resource management; and to further develop appropriate and diversified agricultural systems that are both economically and environmentally supportive of the management of natural resources by villagers and rural communities. The University of Cantho will continue to lead this study.

They will begin by training researchers from the network in community based natural resources management methods and then assist in coordinating work at selected sites in the country where resource degradation or resource conflicts are a major concern.

In Pakistan, a pilot project 'Maintaining Biodiversity in Pakistan with Rural Community Development' is a four year project funded by the Global Environment Facility (GEF) through UNDP. It is executed by the Ministry of the Environment, Local Government and Rural Development and implemented by the IUCN-Pakistan. The project area is located in Northern Pakistan and is characterized by a high altitude cold mountain desert ecosystem.

Apart from nurturing local institutions, capacity building of government institutions was also a focus of the project. The project develops an integrated planning process for biodiversity conservation through the inception of village-level Resource Conservation Plans that are endorsed by a District Conservation Committee. This process aims to devolve control of management of natural resources to local communities and formalise recognition of traditional use rights in pastures and forests. Village Conservation Funds are provided through the project as a common financial resource to support community conservation and land management activities. This project has served as a model for other rural communities seeking empowerment of their lives, and traditional resources and estates. . The project facilitated institutional and policy changes to create an enabling environment for community-based conservation. For example, communities of the Shismal valley close to the Khunjerab National Park have sought technical assistance from the project regarding capacity building for negotiating their involvement in the park including their right to assert the boundaries of their traditional estates and benefit-share in ecotourism ventures within the protected area (Ahmed and Hussain 1998).

In the Syrian Arabic Republic, a project entitled 'Agrobiodiversity conservation and ecosystem rehabilitation in Syria' was initiated by the International Plant Genetic Resources Institute (IPGRI) to provide the people of Nebek, a village near Damascus, Syria, with technical capacity and resources for the preparation of a community-led agrobiodiversity project. The IPGRI website elaborates:

> The objective of this project is to rehabilitate the highly degraded land of Nebek through the re-introduction of indigenous plant species, improve the natural resource base system of local farmers and shepherds, and create ultimately better life conditions for the inhabitants of the area. IPGRI decided to embark in this work, in view of the unique opportunity this initiative offered to bring together various stakeholders (a religious community, shepherds and farmers' associations, the Syrian Ministry of Agriculture and Ministry of Tourism, FAO, IPGRI and ICARDA) under a truly participatory approach (IPGRI 2002).

A local MSc student from Nebek has been trained as part of the project activities.

In Saudi Arabia, the National Commission for Wildlife Conservation and Development of the Saudi Arabian Government recognises the need to develop biodiversity conservation strategies using traditional

modes of management and governance of resources. This marks a departure from Western models of protected area management and reinvigorates the principles of the traditional *Hema* system, discussed earlier, which is a traditional institution for the management of scarce natural resources involving regulated use through community governance structures and the Islamic law.

The Syrian Government Project supports the Badia Rangelands Development Project with a loan from IFAD. This is a participatory project aimed at re-establishing the productive capacity of rangelands using a cooperative strategy involving Bedouin traditional groupings, governance structures, and the negotiation of local agreements (IFAD 2002).

It can be seen from the extensive coverage of examples above, that adult education is a key measure in capacity building in many nations as they seek to promote, protect and facilitate the use of traditional knowledge for conservation and economic benefit.

2.3.2.2 The role of western-based national education systems in capacity building

A second role for education is promoted by nations to educate traditional, local and indigenous peoples in the national education system, predominantly based on the Western education system. For example, while Western education systems have been developing an awareness of the importance of traditional knowledge as part of the jigsaw of global ecological sustainability, some developing nations have been strengthening Western science and technology teaching to enhance their own national development.

The Australian NBSAP recognises the need to integrate indigenous and Western knowledges in school curricula to promote understanding and appreciation of indigenous knowledges and cultures. Section 1.8.6 on Ethnobiological education seeks to ensure that curricula at all levels in Australia promote an understanding of the importance of traditional knowledge and the social and economic benefits of ethnobiology. This will include:

(a) an understanding of Aboriginal and Torres Strait Islander practices that have been instrumental in shaping the biological resources of Australia; and
(b) an appreciation of the cultural heritage of biological knowledge in Aboriginal and Torres Strait Islander communities (DEST 1996:15).

Western science and technology is increasingly looked to as a way of enabling developing communities to benefit from globalisation. Building capacity in science and technology is therefore a high priority for many developing nations, with the idea of 'technological leapfrogging' a particularly appealing prospect.

However, this poses many problems, particularly in postcolonial countries where Western-style education systems are seen as having failed indigenous peoples and local communities. Ma Rhea and Teasdale (2000) discuss the hierarchical school system that has been denounced for promoting only a narrow, memorised form of learning. This situation places indigenous learners in the position of being able to reproduce western knowledge, but lacking the skills to critically analyse or test such knowledge. Similar

observations have been made about European aid, development and, colonisation, where western-based education systems have traditionally required indigenous learners to know more about the geography, history and culture of the colonising people which tends to be regarded as 'better' that locally-focused knowledge.

Furthermore, the demand for enhanced capacity is not always coupled with strong national commitments to environmental sustainability. Even lower priority tends to be given to the traditional resource rights of indigenous peoples and local communities — unless they, themselves, are in control of the government.

In contrast, some parts of the previously colonised world have seen local traditional knowledge re-emerging as part of the process of nation building and development. In such countries particular emphasis is given to incorporating indigenous and local knowledge into science and technology education (*ibid*).

Despite its complexity, a number of themes and protocols are emerging around the use of traditional knowledge in Western science and technology education. A key example — of particular relevance to countries with both indigenous and non-indigenous communities — is the need to develop collaborative learning partnerships.

The basic framework for these partnerships would be that:

- indigenous and non-indigenous knowledge can be taught together within a Western-based science and technology curriculum;
- both indigenous and non-indigenous collaborators have a clear understanding of their rights and responsibilities regarding the inclusion of traditional knowledge in the curriculum;
- the intellectual value of indigenous peoples' knowledge is credited: teachers should convey to their students that indigenous knowledge is as important as Western science;
- there is sound and accurate documentation of local knowledge, particularly traditional ecological knowledge, that has been verified by both knowledgeable indigenous leaders and Western scientists; and
- the traditional resource rights and intellectual property rights of the indigenous collaborative partners are recognised, for example through a sui generis system (a custom-made national system of intellectual property).

Indigenous and local community leaders and teachers would take equal responsibility in devising methodologies for curriculum development and teaching, and in shaping the partnership. It is possible, for example, that the teacher would undergo a period of learning within the local or indigenous community before being entrusted with traditional knowledge that could be taken back to the classroom.

It is clear that the success of this approach relies on a formal agreement between the parties about their rights and responsibilities. This would ideally be guided by a global charter (such as the Draft Declaration on the Rights of indigenous People) and implemented at a national level under *sui generis* protection. It could be envisaged, for example, as a Memorandum of Understanding between a government education

department and an equivalent indigenous body (for example, a Council of Elders education committee).

There are some excellent examples of what can be achieved in indigenous/non-indigenous collaborations once a collaborative learning partnership is in place. See, for example, UNESCO's Teaching and Learning for a Sustainable Future website, and Kawagley & Barnhardt's paper Education indigenous to Place: Western Science Meets Native Reality (*ibid*; see also Ma Rhea and Rigney 2001).

2.3.2.3 The reliability of documentation of traditional knowledge in education curricula

Ma Rhea (2002) has identified protocols for the inclusion of traditional knowledge in education curricula in an online article, 'Raising awareness of indigenous knowledge in science and technology education' posted on the Indigenous Knowledge Dossier of SciDev.Net. She observes that, 'It is widely accepted that for society at large to fully understand the issue, science and technology teachers need to embrace environmental sustainability in their teaching approach.'

National education systems, at a global policy level, are seen as a critical building block in fostering positive attitudes about human rights, equitable resource management and development, and the preservation of the Earth's diversity. But, in the past, Western-based education has also been criticised for dismissing and attempting to supplant indigenous knowledge. It is therefore worth asking why these systems now want to incorporate aspects of indigenous knowledge into their curricula.

Those involved in Western science and technology are beginning to recognise the value of traditional knowledge in terms of gaining an insight into managing ecological sustainability and resource biodiversity. And in one sense, indigenous peoples and local communities might welcome this interest as a chance to preserve their knowledge systems and securing acknowledgement of their rights under international legal protocols.

On the other hand, many are suspicious of business people, scientists, teachers and government officers — whether foreign or local — trying to elicit their traditional ecological knowledge, for example, while refusing to recognise their fundamental human rights.

2.4 Repatriation of objects and associated information to communities of origin

Prior to the implementation of the CBD, collections of germplasm and other accessions were routinely taken from indigenous peoples and local communities and housed in national and internationally administered specimen and gene banks (UNEP, 2001). In 1989, the FAO called for an International Undertaking on the legal status of this material, particularly in relation to the rights of communities of origin. Subsequently, twelve centres of the Consultative Group on International Agricultural Research (CGIAR) signed agreements with the FAO, which recognised the intergovernmental authority of FAO in setting policies for the International Network. Together, the FAO and CGIAR bodies (including the

Regional Collections of the International Coconut Genetic Resources Network which joined in 1998) now hold the designated germplasm 'in trust for the benefit of the international community,' and agree not to claim ownership, or seek intellectual property rights, over the designated germplasm and related information. These Agreements provide an interim solution until the revision of the International Undertaking has been completed. The final form of the agreements will depend on the outcome of the negotiations for the revision of the International Undertaking, and the Agreements might need to be revised in the light of that outcome.

The Genetic Resources Project at International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) maintains a germplasm bank with some 13,855 samples, collected over 104 missions to Asian countries. While ICRISAT has strong collaborative links in India, it also collected germplasm from Australia, Myanmar, Bangladesh, Philippines, Thailand, Vietnam, Sri Lanka, Nepal and Indonesia. ICRISAT repatriates germplasm on request. One of ICRISAT's current initiatives is the repatriation of germplasm held in the ICRISAT collection and by other gene banks to their countries of origin. ICRISAT recognizes that 'joint evaluation of national or regional germplasm in-country could be used to build a database and to enhance [the utilization of germplasm] in the region. Such joint trials could also include farmers of the region to solicit their opinion of the material or document their understanding of its history. This evaluation could be used to train both national scientists as well as NGOs on collection, rejuvenation and conservation techniques which could be important for both *ex situ* and *in situ* collections' (Bramel-Cox & Pundir 1998:107-8).

In Afghanistan, the International Centre for Agricultural Research in the Dry Areas based in Syria has preliminary plans to rescue local varieties and repatriation foreign-held genetic materials in other countries (ICARDA 2003). In the 2001 Work Plan of the *Sustainable Management of Natural Resources and Improvement of Major Production Systems of the Arabian Peninsula* (2001), Oman, United Arab Emirates and Yemen have committed to participating in a program of *ex situ* conservation of the genetic resources of indigenous species which aims to repatriate accessions of indigenous species held in international and other foreign collections.

In the Philippines, national bodies have in the past cooperated with international scientific agencies and pharmaceutical companies, resulting in foreign patent applications over indigenous bioresources. During the 1990s, the Botanical Research Institute of Texas and the Philippine National Museum collected over 100,000 specimens in the most interesting and endangered areas of the country. International firms and foreign governments have worked with scientists within Asian countries of origin and have ultimately patented their collaborative work without sharing benefits. In this way, foreign-owned patents have been obtained for the *amplaya* (Mamantia mordica), *talong* (Solanum melongena) and the Philippine yew (Taxus matrana), which are reported to have great potential in thrombosis (blood clotting), in the human

immuno-deficiency virus (HIV) and, for cancer treatments respectively (Raghavan 2000).

The repatriation of objects and information is not commonly a national priority; rather, countries of origin are concerned to secure intellectual property and access rights over material, regardless of where it is located. A notable exception is the Malaysian Biodiversity Policy (1998) which includes an Action Plan to 'seek cooperation to address the repatriation of information, in particular those not in the public domain.' In general, the inadequate level of information and accompanying data at the time of accession renders repatriation of objects exceedingly difficult. In the absence of comprehensive data identifying the exact source of collected material, the FAO has taken legal responsibility for many collections, databases, and other accessions.

2.5 Strategic planning for conservation and sustainable use of biological diversity within the context of community development planning

Despite the formulation of strategies and action plans in most of the nations canvassed in this Regional Report, there is a need for governments to formally recognise indigenous governance and participation in biodiversity conservation through legal and administrative instruments.

India provides an innovative example of a comprehensive, nation-wide National Biodiversity Strategy and Action Plan that comprises state and regional composite plans, organised according to 'Biodiversity Themes' and, has a strong focus on the protection of indigenous peoples' rights and interests. It commits to the 'recognition, respect and revitalisation of gender differentiated indigenous and community knowledge systems relating to biodiversity, and synergising these with mainstream knowledge systems' (see also Taneja and Kothari 2002). In addition, the Culture and Biodiversity Theme of the NBSAP addresses the role and importance of tribal/traditional knowledges in biodiversity management. Regional planning for biodiversity conservation through the NBSAP is participatory and attempts to include local communities and indigenous and tribal peoples. The NBSAP implements a gender-sensitive decentralised planning approach. The interdisciplinary working groups established under the NBSAP participatory process emphasise the cultural aspects of biodiversity conservation, for example, by sponsoring community-driven events such as biodiversity festivals, street plays *Yatras* and puppet shows.

2.5.1 Indigenous peoples' and local communities' participation in NBSAP processes

Many NBSAPs emphasise particular biophysical environments, arguably at the expense of adequate planning for people who *live* in those regions. In some cases, the population density makes this a necessity for strategic planning: for example, Singapore's key concern is to retain 'green areas' through its Green Plans in the face of overpopulation problems (see Koh Kheng 2002). By contrast, India's NBSAP actively engages with the cultural and socio-economic aspects of biodiversity planning, as well as addressing the areas of conservation and sustainability. The theme of 'Culture and Biodiversity' in the

Indian NBSAP recognises the human/environment relationships and commits to the protection of locally-specific traditional knowledge:

Recognition, respect and revitalisation of gender differentiated indigenous and community knowledge systems relating to biodiversity, and synergising these with mainstream knowledge systems.

India's Thematic Strategy and Action Plans contains over 40 plans at sub-state, state and regional levels) developed to feed into the National-level NBSAP.

The National Biodiversity Strategy and Action Plan for Lebanon recognises the human and ancestral uses of biological resources and the importance of traditional practices. Under the NBSAP, a Protected Areas program has been established which includes measures to protect traditional knowledge. As the NBSAP acknowledges, the 'conservation of biodiversity is a new venture to Lebanese public institutions' and legislative measures are thus still in the strategic planning stage. Lebanon has, however, evidenced a commitment to adopt mechanisms to protect 'the rights of farmers…to benefit from, to share and to further develop germplasm, as well as the right to refuse appropriation and commercialisation'. (National Biodiversity Strategy and Action Plan for Lebanon, 1998:19) Moreover, at the international level, Lebanon was a party to the declaration supporting the legal protection of folklore and traditional knowledge through the *sui generis* approach in the Regional Consultation on the Protection of Expressions of Folklore in the Arab States (1999). The Coastal Area Management Program for Lebanon is implemented by the Coordination Unit of the Mediterranean Action Plan with the Lebanese Ministry of the Environment. It aims to develop integrated strategies for the sustainable development of coastal and marine resources in Lebanon including strengthening the capacity of local communities to participate in biodiversity conservation and cultural heritage protection. Within this program, traditional knowledge is addressed through various thematic activities such as cultural heritage, ecotourism, participatory planning frameworks and the establishment of marine protected areas (Ministry of the Environment:73).

Many National Strategies are actively working to situate indigenous peoples and local communities as partners in national strategic planning processes. The development of Sri Lanka's Biodiversity Conservation Action Plan (BCAP) and the National Environmental Action Plan has involved significant collaboration between NGOs, local groups and governmental bodies. The BCAP was released in 1998. Pakistan's Biodiversity Action Plan was endorsed by the Pakistan Environmental Protection Council in 1999. The Plan emphasizes a partnership role for government agencies, local communities and NGOs in biodiversity conservation.

In Viet Nam, researchers from Hue College of Agriculture and Forestry, Hue University, Viet Nam, are using a 'bottom up' approach to developing strategic plans for conservation of biodiversity by engaging local communities. Building on the results of the previous projects, and with support from the Centre for

International Tropical Agriculture, researchers from Hue College of Agriculture and Forestry, Hue University are using on-farm participatory research processes to identify and test both technical and institutional innovations that will benefit villagers immediately in terms of food security and, eventually, in terms of sustainable and equitable natural resources management. CIAT staff has professional experience from their work in many different countries and will attempt to find solutions that are acceptable to the people of Hong Ha. The project will also study the way in which national agricultural policies and programs are implemented at the community level and thus provide feedback to higher levels of government on their impact (IDRC Project 040407 Natural Resource Management: Hong Ha Commune (Viet Nam) Phase 2).

2.5.2 Some specific planning initiatives

Some nations, although still lacking a National Biodiversity Strategy, have taken steps to ensure indigenous peoples' participation in the strategic planning process. Bangladesh recently organised a workshop attended by senior government officials and NGOs towards the establishment of a Strategic Action Plan. The workshop was also aimed at seeking and identifying options and priority areas for conservation and sustainable use of biodiversity resources by stakeholders. Bangladesh is thus taking steps to meet the international commitments under the CBD, designing a framework at the national level for significant reduction of the current rate of biodiversity loss by 2010.

The Afghan government has instituted twelve Consultative Groups in 2003 to support each of the National Development Programmes defined under the National Development Framework (NDF). The NDF is Afghan's strategic planning framework for national reconstruction and development. The Natural Resources CG is chaired by the Ministry of Agriculture and Animal Husbandry and aims to develop policies and programs for the sustainable development of natural resources, agricultural practices, forestry and the environment. There is also a Livelihoods and Social Protection Consultative Group (FAO 2003).

The Pakistani Government with GEF and UNEP are funding a project, 'Regional - Conservation and Integrated Management of Marine Turtles and their Habitats in the Rompe Sea Area and the Coast of Pakistan'. The overall objective of the proposed project is to promote the long-term conservation and integrated management of marine turtles and their habitats in the Gulf and Sea of Oman through the participation of local communities and integration of local, national and regional level efforts. The project will identify and prioritize important coastal ecosystems and marine turtle nesting habitats in the Islamic Republic of. Iran and Pakistan as the focus of project activities, along side the overall focus on regional cooperation to address broader environmental challenges. Another strategic plan in Pakistan, jointly coordinated by the Punjab Wildlife Department Government of Pakistan and WWF-Pakistan, aims to provide for the conservation and sustainable use of biodiversity in the Ucchali wetlands complex. These

organisations have undertaken Participatory Rural Appraisal workshops to investigate the links between wetlands management and local livelihoods culminating in the preparation of an integrated management plan for the complex involving local communities (WWF-Pakistan 1994).

Like the Indian NBSAP, the Philippines NBSAP features many initiatives specifically targeting the maintenance and protection of indigenous knowledge. The Plan is organised according to five key Strategies, each with several 'thrusts.' This strategic framework informs the development of Programs and implementation of Projects. Measures – both proposed and implemented – aimed at the protection of indigenous people's rights and interests are scattered throughout the following five Strategies. In particular, Strategy I recognises sacredness and cultural identity values of biodiversity for indigenous people, and establishes the Socio-Economic Studies Program to document and incorporate indigenous knowledge systems and practices on biodiversity and sustainable development. Strategy II incorporates indigenous management practices and other community based approaches into *in situ* biodiversity initiatives. Indigenous people are to be afforded preferential access to resources and utilisation in line with Strategy III and the Plan commits to a codification of laws on biodiversity, implementing a system of access fees, incentives and penalties. The identification, delineation and management of ancestral domains are also key aims of Strategy III. A number of programs aimed at promoting and protecting indigenous knowledge are being implemented, notably the Philippines Biodiversity Centre and the Alternative Sustainable Livelihood Development for Bioresources Dependent Communities program (NBSAP 1997).

China has focused primarily on Chinese medicine in relation to the protection of indigenous knowledge. Traditional Chinese Medicine (TCM) is recognised as a national priority in biodiversity conservation through the Biodiversity Conservation Action Plan (1994). The Action Plan's commitment to the sustainable development of traditional medicinal resources has been implemented through the Chinese Government's State Environment Protection Administration and its Traditional Chinese Medicine Department. China has also developed Action Plans in relation to forestry, agriculture, marine and wetland ecosystems that feed into the national Action Plan, ensuring the active participation of the major sectors. At the end of 1997, the State Council approved the 'China's Biodiversity: A Country Study', which determined the objectives of national capacity building for conservation and sustainable use of biological diversity in China in the next fifteen years (1996-2010). It covers areas of legislation, institutional construction, human resources, policy framework, protection facilities, science and technology, education and public participation as well as international cooperation. With the support of international organisations such as the World Bank and GEF, China has implemented projects for national afforestation, development and conservation of forest resources, and the alleviation of poverty through the development of forest products (Second National Report 2001:10-11).

2.6 Legislative (including policy and administrative) measures

Signatories to the CBD are obliged to consider the scope of their legislative protection for indigenous peoples and local communities in light of Article 8(j). The CBD, working from an international viewpoint, is thus playing an important role in formulating legislative responses to the maintenance, recognition and protection of traditional knowledge and practices. By specifically referring to indigenous peoples and local communities in Article 8(j), the CBD has encouraged dialogue between distinctive peoples within nation-states, between local and national levels of government, and between nations in the international legislative arena.

This Report identifies six legislative grounds for the protection of traditional knowledge of indigenous peoples and local communities. First, it is important that problems in national legislative frameworks are identified, and indigenous peoples and local communities are participants in assessments of the strengths and deficiencies of current systems. Second, there is a need to recognise the ethic or historical distinctiveness of indigenous peoples and local communities holding traditional knowledge within the nation-state. As sovereignty over biological resources to the nation-state under the CBD, the national legislature is required to take measures on behalf of its indigenous peoples and local communities. Third, the formal legislative recognition of traditional land and sea tenure is integral to the continued viability of traditional knowledge and practices for indigenous peoples and local communities.

Fourth, management of traditional estates must rest with indigenous peoples and local communities, and legislative support for local governance is needed to ensure that local knowledge and practices are promoted, maintained and protected. Fifth, the interaction between traditional knowledge and intellectual property rights require careful consideration by nation-states. International agreements such as TRIPs weigh heavily upon many countries in this region, especially in light of the prevalence of foreign-owned patents, and many nations have taken a leading role in developing legislative mechanisms to ensure national interests are protected. These initiatives have the potential to provide real, practical benefits to indigenous peoples and local communities through domestic legislation. Sixth, the development of *sui generis* legislation for the protection of knowledge rights for indigenous peoples and local communities is the strongest vehicle available to achieve the objectives of Article 8(j). The legal rights offered by lesser measures such as proprietary title, intellectual property or, environmental protection legislation provide insufficient protection for traditional knowledge in all its tangible and intangible forms. By advocating the introduction of *sui generis* legislation, several countries in this region are working towards a conceptual revision of their national legislative frameworks.

2.6.1 Responding to the CBD: legislative frameworks and reforms

As discussed above, most nations have devised and, to varying degrees, implemented a NBSAP in

accordance with their obligations under the CBD. These processes have often entailed reviewing the existing legislation relevant to the protection of biodiversity, in some cases with a particular attention to traditional knowledge. In Cambodia, for example, the adoption of legislation, by-laws and regulations for the protection of community-based natural resource management is a strategic objective of the recently released National Strategy and Action Plan. Cambodia is reviewing existing legislation concerning biodiversity, including by-laws and regulations under the 1996 Law on Environmental Protection and Natural Resource Management. The guiding principle for these reviews acknowledges the need to strengthen laws relating to land property rights, protected areas and intellectual property, and to facilitate community-based natural resource management in all sectors.

Many national strategies now contain strong commitments to the development of legislation for the protection of rights and interests of indigenous peoples and local communities. In Jordan, the First National Report to the CBD (2001:33) acknowledges that forests, pastures and intellectual property are not adequately addressed under the national legislation, and commits to the preparation of new by-laws and regulations related to the 1995 Environment Law. While the Environmental Protection Law offers some protection for the maintenance of traditional practices, amendments have rendered its administration confusing and impractical. Importantly, Jordan has recognized the need to better inform the public of the existence of the Environment Law, and to implement associated reforms in other legal areas such as intellectual property regimes.

The Republic of Korea's National Biodiversity Strategy (1997) reviewed the national laws and policies, and acknowledged that 'the rights of providers, including local residents, who provide materials from crop samples and genes, have been neglected… [As a result] benefits from using genetic resources have not been fairly and evenly distributed between providers and users.' Further, the NSBAP (1997:70-1) commits to the development of measures to 'jointly and evenly enjoy the benefits and results of biotechnology'.

While some nations have not yet developed mechanisms for the retention and protection of traditional knowledge, the issues arising from Article 8(j) have been recognised. Iran's Second National Report (2001), for example, acknowledges the richness and importance of diverse indigenous knowledge (villagers and nomads in particular) and states that national legislation to protect traditional knowledge is in the early stages of development. Similarly, Syria's Second National Report (2002) recognizes traditional knowledge as an important part of biodiversity conservation, although preliminary development of legislation is just underway. The Biodiversity Strategy and Action Plan for the Syrian Arab Republic (included as part of the First National Report, 1997: 32) identifies the development of legislation to safeguard intellectual property rights and genetic resources of local plants and animals as one of its strategic objectives.

While the CBD strategic planning processes can encourage engagement with the issues surrounding Article 8(j), it is important that nations enshrine NBSAP commitments in domestic legislation. While the comprehensive Chinese NSBAP contributes to the coordination of protective measures in the Constitution, related laws, administrative regulations, local regulations and laws and rules, China does not have a national Biodiversity Act. Wang *et al* (2000) recommend that:

> …the [NBSAP] strategy should be converted into legislation through a National Biodiversity Act. The CBD provides a comprehensive approach to biodiversity management, which needs to be reflected in a National Biodiversity Act, and in provincial legislation. Such legislation should incorporate new policy measures for implementing the CBD, including biodiversity conservation, sustainable use of biological resources, and the equitable distribution of benefits arising from such use.

The contribution of indigenous peoples and local communities in national strategic planning processes has contributed to the strength of Sri Lankan proposed legislative reforms. Under the Sri Lankan National Biodiversity Action Plan, a review of the existing national legislation and administrative procedures for the control of access to genetic resources was conducted by a Legal Task Force. Finding the existing legal mechanisms inadequate to ensure the sustainable use of biological resources and the equitable distribution of benefits, the Task Force has recommended that more comprehensive protection for indigenous knowledge rights is required. The Task Force has drafted legislation to:

- establish a designated authority and processes for considering applications for biodiversity prospecting and developing appropriate agreements with applicants;
- provide legal sanctions for violations; and
- provide a statutory system to put in place procedures for applications, monitoring, etc.

Under the proposed law, an inter-agency committee (with representatives from all relevant agencies) will examine requests for research on, and collection and use of, genetic resources for scientific and commercial purposes. Furthermore, the Sri Lankan Ministry of Health and indigenous Medicine is currently reviewing the existing legislation with a view to strengthening the protection of traditional knowledge relating to the use of medicinal plants. As an interim measure, guidelines for safeguarding intellectual property rights in relation to the collection of ethnobotanical information have been prepared (Mahindapala 2002:16).

Some nations have focussed on conservation of biodiversity and have not addressed the specific issues of Article 8(j). Pakistan's *Environmental Protection Act 1997* focuses on the establishment of protected areas, and tend to place a heavy emphasis on fauna protection. Many ecosystems are managed by local communities outside the protected areas system, thus there is a lack of relevant regulatory frameworks. Anwar and Shank (2001:436ff) argue that Pakistan's environmental laws do not adequately address indigenous interests in biological resources and protection of knowledge.

Often due to economic or political turmoil in recent years, some countries have yet to commit to a review

of current legislation or the development of more comprehensive legislative frameworks. Given recent events in Afghanistan, for example, there is a need to develop appropriate administrative structures and organizational frameworks before any substantive implementation of CBD obligations can occur. There is at present no legislative base for the activities of the Forestry Department or other initiatives aimed at the conservation of biodiversity. A Forest Law providing for the creation and management of a system of protected areas has been drafted but not enacted. In Afghanistan, the CBD has not been ratified, which may impede the preparation of a National Biodiversity Strategy addressing issues of biodiversity protection. In Indonesia, while there is much legislation pertaining to biodiversity conservation, the National Report to the CBD registers an absence of laws specifically addressing the problems of bioprospecting for indigenous peoples and local communities. While local level governments have implemented community-specific measures to respond to particular situations, no integrated or nationally-consistent approach has yet emerged.

Where countries have not produced a report to the CBD or a National Strategy it been difficult to obtain information of the laws in place in relation to the protection of indigenous peoples' and local communities' interests in biological resources. However, Thailand has developed strong legislative measures for the protection of indigenous knowledge outside the CDB framework. Thai regulations on the collection and conservation of botanical resources were implemented in 1992 and regulations for access to biological resources were first drafted in 1993. Thailand has yet to formally ratify the Convention on Biological Diversity. Thailand's ratification has been resisted by local NGOs because of the CBD's perceived potential to weaken the nation's strong position on ownership and control of biological resources and related knowledge (Vivajsirin *et al* 2001).

2.6.2 Recognition of indigenous peoples and local communities *as ethnically or historically distinctive holders of traditional knowledge*

As the CBD affirms national sovereignty over biological resources, constitutional recognition of indigenous peoples and local communities provides a strong basis upon which to enact domestic laws for their benefit. Constitutional acknowledgement of the *existence* of indigenous peoples and local communities, in many cases, informs the legislative protection of indigenous peoples' and local communities' rights. However, even without a constitutional mandate, nations have enacted legislation that recognises the unique position of indigenous peoples and local communities *vis-à-vis* the nation state.

2.6.2.1 Constitutional recognition

Not surprisingly, there is some correlation between nation-states which recognise their distinctive indigenous peoples and local communities in the Constitution and those which have adopted a progressive approach to the protection of those peoples' rights. In the Philippines, the adoption of the 1987

Constitution provided recognition and protection of rights for indigenous cultural communities (see Article XIV section 17). From this constitutional base, some innovative and progressive legislation to protect traditional knowledge have emerged.

The Constitution of the Peoples' Republic of China vests responsibility with the State to guarantee rights and provide assistance for minority nationalities. Article 4 states:

> The state protects the lawful rights and interests of the minority nationalities and upholds and develops a relationship of equality, unity and mutual assistance among all of China's nationalities...
> All nationalities have the freedom to use and develop their own spoken and written languages and to preserve or reform their own folkways and customs.

The Constitution also provides for the development of both modern and Chinese traditional medicine (Article 21). In the autonomous region of Mongolia, the Constitution protects the rights of ethnic groups to practice their native tongues and cultural activities, within a constitutional framework of dominant State ownership.

India has favoured decentralized forms of government to strengthen local-level control of land and resource use. The Indian Constitution provides for the Administration of Tribal Areas in the States of India. Certain regions are declared Autonomous States under the Constitution, which enables regional customary laws to be recognized and implemented in these States. As Taneja and Kothari (2002:377) explain,

> Panchayats, or local institutions of self-governance, have been in existence in India since before independence, though they were dependent on state governments' political will to recognise and delegate powers to local level. In 1993 the Constitution (73rd Amendment) Act was passed, whereby the Panchayati Raj system — devolving administrative powers to the local village level — was institutionalized as a third level of governance. In essence, states are mandated to recognise panchayats as institutions of self-government. The states are responsible for preparing plans economic development and social justice for the areas under panchayat jurisdiction.

The result of this structure is that local-level and customary forms of governance are recognised in India.

By contrast, the differential recognition of local groups in the Constitution of Malaysia has at times frustrated attempts to coordinate a nationally consistent system. Each of Malaysia's thirteen states has its own legislature. While Malaysia's constitutional system ensures local governance for local communities, the fragmentation of legal control in relation to traditional knowledge has resulted in unequal distribution of rights for indigenous peoples and local communities. State law-making powers in respect of traditional knowledge, local land management and intellectual property are scattered between the various (national, state and municipal) competencies. Furthermore, the States of Sabah and Sarawak have a special constitutional status which guarantees them special rights. As a result, Sabah and Sarawak are excluded from national plans for land use, local government and development.

The Indonesian Constitution recognises indigenous institutions, as well as organizations, mechanisms, laws, rights and obligations within the institutional system of the indigenous peoples. However, like Malaysia, the multifarious system of government in Indonesia has led to tensions between local and centralised governmental institutions (see below 2.6.2.2). As Indonesian indigenous territories are considered special territories, the Indonesian Constitution affords special treatment for indigenous groups whose interests differ from those of the mainstream.

The Republic of Korea, similar to other nations in the region, does not recognize any groups classified as indigenous people which are considered, in a legal sense, differentially to the interests of the nation state. Thus, Korea maintains that it is unnecessary to establish a national policy for the protection of indigenous rights (see Korea's response to survey by the United Nations 1997). There are, however, 15 large communities (1 capital metropolitan city, 5 metropolitan cities and 9 provinces) and 230 local governments (smaller cities, city districts, and counties) which, in conjunction with the National Action Plan are afforded decision-making powers in relation to environmental programs (*ibid*). Similarly, Singapore (as a relatively small land mass and a high density population) does not conceptualise indigenous peoples' or local communities' interests as distinct from those of the nation. The State owns about four-fifths of the land, and under the Land Acquisition Act, the state can acquire land for any public purpose, or for any work or undertaking which is of public benefit, public utility or public interest.

2.6.2.2 Legislative recognition

Although the Indonesian Constitution recognizes the existence of traditional political entities derived from the cultural systems of the indigenous peoples of Indonesia, Alcorn and Royo (2000) argue that laws implemented by the central Indonesian government under President Suharto undermined the constitutional protections afforded to indigenous people. They illustrate the effect of the Indonesian laws on the Dyak of West Kalimantan. As previously discussed in the Case Study example, while *adat* (traditional law) is expressly recognized under the *Ministry of Internal Affairs Regulation No. 3, 1997 on the Empowerment, Sustainability and Development of Customs, People's Tradition and Adat Institutions at the Local Government Level*, the regulation imposed a new governance structure – an 'Adat Council' – in every district and sub-district. Alcorn and Royo (2000:29) argue that:

…these 'Adat Councils' serve as the government means of intervention in adat affairs, and as such have positioned the real adat leaders as subordinates. Formerly, the highest-ranking adat institution was Temenggung, but now, the Sub-district and District Councils, and the 'Adat Assembly' at the provincial level, have become superior. The result is that the adat leaders are no longer independent. Intervention by 'Adat Councils' is very strong. Most members of these 'Adat Councils' are those who are in government—businessmen in fact—who have very limited understanding of adat and adat law. These people use the 'Adat Council' to promote issues in

their own interest. 'Adat Councils' have provided a means to legalize palm oil plantations and forest. Only a few of the 'Councils' actually reflect the will of the indigenous people.

Legislative recognition of particular indigenous populations and local groups by national governments without a constitutional mandate tend to be more selective and provide weaker protective measures. In Japan, the Ainu people of Hokkaido are not identified in the Constitution but are recognised as a distinct cultural group under the *Promotion of Ainu Culture and Dissemination of Knowledge of Ainu Traditions Act 1997*. The Act requires government to develop programs for promoting Ainu culture and traditions but falls short of granting Ainu protections for land or recognition of them being holders of traditional knowledge. In Australia, the lack of rights afforded indigenous peoples in the Constitution – and the fact that it makes no mention of the special status of indigenous people – similarly falls short of full protection for indigenous peoples and their knowledge.

Bangladesh's draft *Biodiversity and Community Knowledge Protection Act 1998* represents a strong commitment to the protection of indigenous and local peoples' rights. The draft Act recognizes and reaffirms that the people of Bangladesh are constituted into diverse communities and localities, diverse life styles and cultures in various ecosystems. It establishes the National Biodiversity Authority as a regulatory body to ensure proper implementation and enforcement of the provisions of the legislation. While the draft Act provides for the community co-ownership of biological resources, knowledge and innovations, this community ownership cannot occur without co-ownership of the State, thereby necessarily tying local people's interests to those of the State.

2.6.3 Traditional tenure of land, sea and waterways and other land use rights

Without rights to traditional estates, the continued existence of indigenous peoples and local communities is at risk. In the regions covered by this Report, the displacement of indigenous peoples and local communities in the wake of industrialising national projects is well documented. A preliminary step to ensuring the continued existence of traditional knowledge must be that indigenous people and local communities have secure tenure so that they can maintain, cultivate and continually renew their traditional knowledge.

The social project thrust upon the Australian legislature by the High Court decision in *Mabo No 2* (1992) and *Wik* (1996) is to accommodate Aboriginal land tenure systems alongside the Australian system and, thus, to accommodate the cultural, social and economic differences which arise from the existence of parallel or plural legal systems. The *Native Title Act 1993* represented the legislative response to *Mabo No 2* (1992); however the denial of the property rights of indigenous people which resulted from amendments to the Act in 1998 has raised concerns about its constitutionality and lack of compliance with international conventions on racial discrimination (Langton *et al* 1998). The possibility of using native title as a means of providing protection for traditional biodiversity-related knowledge as intellectual

property has not been thoroughly explored in Australia (Fourmile 2000). Although the *Native Title Act 1993* provides for sea rights of indigenous Australians, in practice the High Court has declined to grant exclusive sea rights to indigenous sea estates (see *Commonwealth v Yarmirr,* 2001).

In Indonesia, recent reforms to the Forestry Law (1999), the Local Government Law No. 22, 1999 (recognizing the adat structures and territorial rights of indigenous peoples) and the Minister of Agrarian Affairs Decree No. 5, 1999 (providing for indigenous land rights) would seem to afford legislative protection to customary governance and land tenure. However, at least in relation to the Forestry Law, ambiguity surrounds the administrative implementation and enforcement arrangements. Baines and Hendro (2002: 138) suggest that:

> While national policy now provides for some recognition of *adat* (customary) law relating to land ownership, use and management, no clear definition of the scope of this policy has emerged. Procedures and mechanisms for customary land and sea rights have not been determined either. Clear and legally supported adat law could greatly improve the prospects for effective community-based management of biodiversity…

Ferrari (n.d. unpubl. msc.) provides a similar example in the Malaysian state of Sarawak. While customary land rights are recognised by the Sarawak Land Code, they are poorly defined and vague on the ground. Ferrari (*ibid)* notes that:

> The community of Uma Bawang, Upper Baram River, Sarawak, Malaysia, split into two over disagreement concerning the presence of logging companies on their customary land in the late 1980s. Customary land rights are… easily extinguished by the government and completely disregarded by logging and plantation companies. The anti-logging group of Uma Bawang built an alternative settlement and have started a community forest area and integrated agriculture in the early 1990s. They also undertook community mapping with the main aim to make sure that the community will have land rights over the area they are developing, which is part of their customary land.

The Thai Constitution was amended in 1997 to provide local communities with a more substantive role in managing their own resources (Vivajsirin *et al* 2002:266-7). The *Community Forest Act 1996*, which has not yet been enacted, would further strengthen the traditional management structures of indigenous peoples in forest areas. Although it is not an Act intended to affect land rights, it provides a legislative protection of indigenous people's rights to manage and (within limits) use the resources of forests.

A similarly strong emphasis on the participation of local communities is evident in Nepal's *Local Self Governance Act* (1999) and the *Forest Act* (1993, and see also the Regulations, 1995). The forest legislation, which concerns the conservation, management and sustainable use of forests and forest resources, empowers communities to manage and police their own resources. There is, however, some concern about the administrative arrangements of the *Forest Act*, and particularly the range of functions that can be delegated to individual community members (for instance, an individual can simultaneously act in managerial, policing and judicial role under the *Forest Act* (Parajuli & Pokhrel 2002:473ff).

2.6.4 Facilitating the conservation and sustainable use of resources for indigenous peoples and local communities

2.6.4.1 Biodiversity Legislation

Lebanon's *Law for the Protection of the Environment* recognises the importance of traditional knowledge in rural areas. The Lebanese Government has supported contractual agreements between research institutions and local agriculturalists. The Ministry of Agriculture has approved an agreement between the Lebanese Agricultural Research Institute (LARI) and The Board of Trustees of the Royal Botanic Gardens. The parties have made provision for access and benefit-sharing arrangements in relation to a seed collection of indigenous plant species (listed on the WIPO Traditional Knowledge and Cultural Expressions Contracts Database).

Australia's *Environment Protection and Biodiversity Conservation Act 1999* ('EBPC Act') refers to involvement of indigenous Australians in biodiversity conservation. Three of the seven objects of the EPBC Act (s3), relate to indigenous involvement into Australia's biodiversity. These are:

- to promote a co-operative approach to the protection and management of the environment involving governments, the community, land-holders and indigenous peoples;
- to recognise the role of indigenous people in the conservation and ecologically sustainable use of Australia's biodiversity; and
- to promote the use of indigenous peoples' knowledge of biodiversity with the involvement of, and in co-operation with, the owners of the knowledge.

As a result of this legislation a number of initiatives have been adopted. The Act provides for the negotiation of bilateral agreements between the Commonwealth and the States and Territories and that the Minister may, under s49A, enter into such an agreement only if he or she has considered the role and interests of indigenous peoples in promoting the conservation and ecologically sustainable use of natural resources in the context of the proposed agreement, taking into account Australia's relevant obligations under the Biodiversity Convention**.**

Fourmile in her contribution to the Voumard Report argues that while the EPBC Act addresses the important provisions contained in Articles 8(j), 10(c) and 18.4 of the Convention on Biological Diversity, it falls short of providing intellectual property-style protection for communally-held traditional knowledge. The formation of contracts and prior informed consent agreements under the Act may provide some legal protection of Traditional Knowledge however the development of a legal regime that recognises traditional knowledge of biological resources as intellectual property under a *sui generis* system will, as Fourmile advises, provide a higher degree of certainty for all parties and attract greater recognition in court proceedings (see Section 2.6.5 below).

While biodiversity legislation has often strengthened the participation of indigenous peoples and local communities in land and resource management, benefits have not always accrued to the participants

themselves. For example, the Malaysian *Sabah State Biodiversity Enactment 2000* has been criticised as lacking an appropriate regulatory framework to protect the interests of Sabah communities (Biowatch South Africa 2002). It has been used for the purposes of protecting intellectual property rights for commercial purposes, without adequately acknowledging local claims to ownership.

2.6.4.2 Forests and Protected Areas Legislation

The creation and regulation of protected areas, discussed above, provides a means by which indigenous peoples and local communities can assert local governance. In many countries, the legislative framework of protected areas also entrenches the capacity-building and incentive measures, also outlined earlier in this Report. In Nepal, the *National Parks and Wildlife Conservation Act 197*3, and particularly the 1993 amendments to that Act, provide for the establishment of parks and their 'buffer zones'. The Act ensures that local people are involved in planning and management decisions. Under the Omani Law on the *Protection of the Environment and Prevention of Pollution 1982*, responsibility for the implementation of laws is shared between the Ministry of Regional Municipalities and Environment and the local municipalities themselves (Stoval 1998). The Law established a system of protected areas which recognize the harvesting, grazing and other land use rights of local peoples living within those areas (for example, Al-Saleel National Park and the Khawrs Reserve of Dhofar Coast: see Ministry of Regional Municipalities and Environment and Water Resources 2002).

Locally-specific laws for the protection and management of local areas provide a legally enforceable mechanism for local community management of traditional estates. In India, the *Wildlife Protection Act 1972* confers hunting rights to Scheduled Tribes in India. The Chinese provincial Peoples' Congresses have also implemented local laws covering specific land and resource management issues in provincial regions (see, for example, the *Enforcement Regulations Regarding Management of Forests in Guangdong Province*; the *Provisional Rules Regarding the Protection of Rare and Endangered Wild Plants in Liaoning Province*; *Provisional Rules Regarding Management of Wildlife in Jilin Province*; *Regulations on Nature Reserves in Zhejiang Province*). The Mongolian Government under *Resolution No. 125 of 1998* has implemented a licence system for the management of forests and use of forest resources (see, for example, the *Law on Fees for the Harvest of Forest Timber and Fuelwood, Law on Natural Plant Use Fees,* and *Law on Hunting Reserve Use Payments*). Since 1998 the Government had issued contracts of 20-40 years duration to 6 communities (FAO 2000). However, contracts covering an area of 11,800 ha (for 60 years duration) have been granted to private logging companies, having a potentially adverse affect on local people living in regions with high economic value.

In Laos PDR, the *Order 54/MAF on the Customary Rights and Use of Forest Resources* (1996) secures legal rights for local people to use forest resources for subsistence, including the hunting and fishing of

non-protected species. Customary rights may be recognised by signed agreement or by law, and local people shall be compensated for loss of customary means of livelihood. Despite these measures, Baird argues that 'there is no legislation to ensure that the rights of local people within protected areas are recognized.'(Baird questionnaire 2002 cited in Ferrari n.d. unpubl. msc.) Stuart Chape (2002:177) also expresses concern that the laws operate in the national interest rather than for the protection of local peoples. He contends that:

> The continuing lack of development in rural areas, where most of the population lives, means that if initiatives to conserve natural resources are to succeed they must be linked to the needs of the nation and those of local communities. This is difficult, especially when centralized natural resource actions do not provide adequate benefits for local communities.

Chape illustrates his point by analyzing the effect of Prime Minister's Decree 11, announced in August 1999. Under the decree, forest resources and profits from their exploitation are deemed to belong to the state, not to villagers. This is contrary to the National Environmental Action Plan which commits the Lao government to providing community incentives to manage their own resources. The decree was used to undermine an internationally-funded Forest Management and Conservation Project to promote sustainable village forestry. Chape (2002: 177) points out that:

> Actions like these by the government will not encourage rural communities to sustainably harvest natural resources, especially in areas where traditional resource use attitudes and methods are breaking down and resources are becoming scarce.

2.6.4.3 Legislation for the protection of traditional medicinal resources

Bhutan has a strong history of legislation for the protection of its medicinal plants. As early as 1974, the National Forest Policy identified medicinal plants and herbs as resources yet to be fully exploited. Bhutan's *Forest and Nature Conservation Act 1995,* which focuses on the conservation of forests and the protection of wildlife and wildlife habitat, provides a framework for the establishment and management of protected areas, social forestry and species conservation. The Director of Forests approved a proposal that, firstly, banned exports of medicinal plants, and secondly, established joint efforts by the Department of Forests and the National Institute of Traditional Medicine to both collect and cultivate medicinal plants.

Bhutan has also placed restrictions on the export of traditional (and over-exploited) products through the *National Plant Quarantine Act 1993*. Traditional vegetable dyes, for example, can now be used only for domestic purposes. No legislation, rules or regulations have yet been enacted for essential oils, mushrooms and other forest products. Access to, and transfer of, key plant species is subject to restriction, however, the Bhutanese government (1997:96) has experienced difficulties in enforcing the law 'without the legal arsenal to support [its] contextual application.' While the regulatory framework facilitates the sharing of benefits, 'loopholes in the current system give rise to misuse and loss of mutual trust' (*ibid*).

The development of more stringent legislation is a strategic objective of the Bhutan's Biodiversity Action Plan.

China has passed legislation for the protection of traditional medicines under the *Law of Traditional Chinese Medicine Management 1984*. Article 3 provides that the State will protect the wild medicinal resources and encourages the breeding of Chinese traditional medicine. The *Regulation Concerning the Management and Protection of Wild Medicinal Resources (1987)* lists wild medicine plants and animals for protection and provides that the wild medicinal resources shall be managed sustainably for conservation and utilization. The Policy of Integrated Conservation and Utilisation (enshrined in the *Law for Wild Animal Protection*) has been Government policy since 1970s. The Policy protects wild medicinal resources through financial and pricing readjustment to encourage artificial reproduction of domestication of wild animals and plants in order to protect wild medicinal resources. China also intends to introduce a system of biological resources accounting into the national economic accounting system. According to the First National Report (1997) 'the policy of non-gratuitous use of biological resources will be carried out and the rule of compensation for utilization of biological resources or the resource tax will be promoted.'

2.6.5 The intersection between traditional knowledge and intellectual property rights regimes

It is at the intersection of intellectual property rights and traditional practices of indigenous peoples and local communities that the debate about legislative measures to protect traditional knowledge has caused most controversy. Many well documented cases (see, for example, the United States' patent on turmeric which was successfully challenged by the Indian government) testify to the potential for abuse when monopoly rights are granted over traditional knowledge. In particular, intellectual property regimes of patents and plant breeders' rights have been the subject of much debate. Community-based rights are also the subject of some concern as intellectual property rights are usually granted to individuals.

2.6.5.1 Plant Breeders' Rights

The *Union International pour la Protection des Obtentions Vegetales* (The Convention for the Protection of New Varieties of Plants-UPOV) system of *sui generis* protection for plant breeders is designed to ensure that commercial plant innovations. China, Australia, Korea and Japan are UPOV members (India has initiated for UPOV membership and several countries are in touch with UPOV in the development of their national legislation for the protection of plant varieties: Vietnam, Pakistan, Oman, Malaysia, Sri Lanka, and Saudi Arabia). Australia, Japan and China have also granted patent rights over plant varieties. Lebanon has also implemented a law regarding plant varieties.

India and Thailand have already enacted legislation which seeks to balance the rights of plant breeders and farmers. The Act is limited in scope to the commercial exploitation of plants. The Indian *Protection*

of Plant Varieties and Farmer's' Rights Act 2001 requires breeders to deposit seed of the registered variety in the National Gene Bank (Article 27(1)). Through the establishment of a gene fund (see Article 41), the Act provides for benefit-sharing between plant breeders and village or local communities for their contributions to the evolution of the variety. The Act respects that farmers are breeders, cultivators and conservationists of seeds, enables farm-bred varieties to be registered in the same manner as commercial plant strands, and affords farmers the right to save, use, sow, resow, exchange, share or sell farm produce, provided it is not already branded (see Article 39). The Thai *Plant Varieties Protection Act* (1999) contains protection for community varieties conserved and developed in a particular locality (ss43-51) and benefit-sharing provisions (s 52).

China's most recent legislation relating to the protection of traditional knowledge is the *Regulation on the Protection of New Varieties of Plants* (1999) and the associated Rules for its implementation (in forestry and agricultural sectors). In addition, Hong Kong has a *Plant Varieties Protection Ordinance* (1997), and Taiwan's *Plant Seed Law* (1988) is in force. Given the strong legislative framework for protection of traditional knowledge in China (see Section 2.6.3 above), these new measures highlight the influence of international agreements, such as UPOV, in China.

Bangladesh's draft *Plant Varieties Act 1998* is to be read in conjunction with the protections for indigenous people in the *Biodiversity and Community Knowledge Protection Act* and in no way should abrogate rights afforded under that Act. It is limited to the commercial exploitation of plants. It therefore represents a response to international obligations such as TRIPS which aims to balance commercial plant breeders' rights with the protection of traditional knowledge.

In Malaysia, the draft *Protection of Plant Varieties Act* (1999) protects plant breeders' rights. It has been criticized for failing to adequately protect traditional breeders' rights (for an argument for *sui generis* legislation to protect indigenous knowledge see Nijar 1999). No legislation specific to benefit sharing with indigenous people for the use of biological resources or traditional knowledge is currently in place. Some national access controls are in place for foreign researchers but they pre-date the CBD. No new specific national legislation is currently planned. Instead, another approach is being developed (Ozman & Zakri 2001:60). It is premised on five elements comprising:

- An access licensing scheme,
- An access agreement,
- Revised government research guidelines,
- A coordinating body and
- Amendments to existing intellectual property law.

At a workshop organized by the IUCN, various governmental agencies agreed to explore the possibility for new legislation. The workshop identified a number of options that could be considered:

- Amending existing sectoral legislation;
- Enacting a national (Federal) framework law applicable to Peninsular Malaysia;
- . Enacting a national (Federal) framework law applicable to the whole of Malaysia;
- Amending existing sectoral legislation and enacting a separate law to address the gaps or loopholes; or
- . Enacting model state legislation for the individual states to adopt.

2.6.5.2 Patent problems

Japan has been a key player in the development of international agreements regulating the use of intellectual property. Consequently Japan has a well developed system of intellectual property rights and seeks to protect indigenous knowledge through these structures. Japan's recently enacted patent laws do not address issues of traditional knowledge protection. In a recent WIPO questionnaire (2002) on national responses to the protection of indigenous knowledge, Japan acknowledged that under its patent laws:

> …traditional knowledge might not meet those requirements if the traditional knowledge has already been available to the public. Consequently, no exclusive rights are granted to the invention…
> Nevertheless, the above limitations could be cleared if the traditional knowledge [was deemed to belong] to apparently identified entities and meets *(sic)* the requirements of patentability. Therefore, those limitations are not originated from traditional knowledge itself, but from the existing IP system. (p. 1)

This response acknowledges the difficulties of protecting traditional knowledge through patent laws, but legislative measures addressing these problems have not been forthcoming.

The Philippines has a specialised *Traditional and Alternative Medicine Act 1997*, which seeks to uphold the rights of traditional practitioners. Unlike the legislative measures discussed below, rights under the traditional medicine statute are not granted to indigenous people *per se*; rather, these Acts seek to broaden the scope of existing intellectual property regimes to accommodate traditional knowledge. In 1998, Thailand also passed a *Traditional Medicine Act*. In Indonesia, the intellectual property laws accommodate the protection of Indonesian medicinal herbs (*jamu*). In a recent WIPO survey on existing forms of intellectual property protection for traditional knowledge, Indonesia responded that the laws on 'trade secrets' may provide an avenue for the protection of registered medicinal uses of biological resources.

Cambodia has signed an Agreement with the United States of America on Trade Relations and Intellectual Property Protection Article XI.1 1996. Article XVIII of the Agreement deems patents to be obtained, whether the invention is imported or locally produced, 'without discrimination.' In effect, this means that US patents will be enforced in Cambodia (and vice versa), thus enhancing the trade partnership between the two countries. The Agreement makes no mention of indigenous people's rights or

the protection of traditional knowledge.

Qatar has taken an active role in international fora in relation to the need to prevent the patenting of life forms as required under Article 27.3(b) of TRIPS. Qatar hosted the 2001 WTO Doha Ministerial Conference on the TRIPS Agreement, where Qatar non-governmental organizations promoted an international commitment to respecting the right of developing countries to determine the need for appropriate *sui generis* laws that effectively protect community and farmers' rights, and promote agricultural diversity and sustainability.

In relation to intellectual property, Article 39 of the Qatar Copyright Law No. 25 of 1995 provides for the protection of folklore matters whereby the State 'shall endeavour to protect the national folklore by all legal means and methods and shall exercise the authors' rights in works of folklore…' Qatar is party to the Gulf Cooperation Patent Law but does not have its own statute regarding patents.

In India, the protection of bio-resources and associated knowledge has been addressed in the *Patents (Second Amendment) Act 2002*. Section 10 of the Patents Act 1970 (as amended) provides for the mandatory disclosure of source and geographical origin of the biological material used in inventions. Section 25 (as amended) deems non-disclosure or wrongful disclosure pf the above information as grounds for opposition and for revocation of the patent, if granted. Moreover, to prevent patents based on undocumented knowledge, provisions have been incorporated to include anticipation of invention by available local knowledge, including oral knowledge, as one of the grounds for opposition as also for revocation of a granted patent.

2.6.6 Sui generis *forms of protection of the rights of indigenous peoples and local communities*

It is evident that India is a world leader in the development of specific legislative mechanisms to protect traditional knowledge. As early as 1994, the Indian *Karnataka Community Intellectual Rights Bill* proposed a *sui generis* system in respect of plant varieties in the territory of Kamataka, India, which explicitly recognises community rights. In the same year, The *Model Biodiversity Related Community Intellectual Rights Act* was drafted by a group of NGOs. In India's Thematic Report on Access and Benefit-Sharing, *sui generis* legislation is identified as necessary to protect traditional knowledge because:

Protection of knowledge, innovations and practices associated with biological resources… do not seem to meet the conditions required for grant of patents or other IPRs (e.g. copyrights, trademark, etc.) under the prevalent IPR regimes, i.e. novelty, inventiveness and industrial applicability. These conventional forms of IPRs are inadequate to protect indigenous knowledge essentially because they are based on protection of individual property rights whereas traditional knowledge is by and large collective. Further, the informal knowledge presents other difficulties in being recognised for the purpose of IP protection, such as:

- Knowledge is developed over a period of time and may either be codified in texts or

retained in oral traditions over generations. The conditions of novelty and innovative step necessary for grant of patent are therefore not satisfied; and

- Knowledge is quite often held in parallel by communities (*ibid:*3)

In response to these issues, India has enacted the *Biodiversity Act 2002* which provides for the conservation of biological diversity, the sustainable use of its components, and the equitable sharing of the benefits arising out of the use of biological resources. In particular, s 36 (iv) of the Act provides for protection of traditional knowledge through knowledge/biodiversity registers, and development of a *sui generis* system for traditional protection. The National Biodiversity Authority (NBA) is established under the Act to manage equitable benefit-sharing from use of biological resources, and granting of intellectual property rights. Sections 19 and 21 of the Biodiversity Act require prior approval of the NBA before access to resources is granted, on terms and conditions which secure equitable sharing of benefits. Section 6 provides that anybody seeking any kind of intellectual property rights on a research based upon biological resource or knowledge obtained from India needs to obtain prior approval of the NBA. The NBA will impose benefit sharing conditions. Section 18(iv) stipulates that one of the functions of NBA is to take measures to oppose the grant of intellectual property rights in any country outside India on any biological resource obtained from India or knowledge associated with such biological resource.

The Philippines has also made some remarkable advances in implementing Article 8(j) of the CBD, and in relation to the protection of the rights of its indigenous peoples more generally. Article XIV section 17 of the 1987 Constitution, which enshrines the rights of indigenous cultural communities, has given rise to three notable instruments, namely:

- Executive Order No 247 'Prescribing a Regulatory Framework for the Prospecting of Biological and Genetic Resources, their By-products and Derivatives, for Scientific and Commercial Purposes, and for Other Purposes' (1995);
- The 'Implementing Rules and Regulations' for Executive Order 247 (1996); and
- The indigenous Peoples Rights Act (1997) and its 'Implementing Rules and Regulations'.

Furthermore, a Community Intellectual Rights Protection Act (1994, updated 2001) is currently in draft form. Although the bill has not been enacted, it represents the Philippines legislature's willingness to consider the special forms of protection that may be necessary for the practical implementation of Article 8(j). This system, which chiefly involves the creation of registers of indigenous knowledge and local practices, operates separately from the patent system, which is alien to indigenous philosophy in the Philippines.

There are concerns that the bioprospecting industry has been damaged by these measures, as only a few agreements have been approved since the implementation of the scheme. The regulatory framework for EO 247 has been criticised as excessively bureaucratic. A respondent to our questionnaire also suggested that information dissemination to local communities is not as good as it could be. Despite these

administrative problems, a number of important schemes and registries are being established, in marine environments as well as terrestrial ones.

Countries such as Bangladesh and Pakistan are considering the introduction of *sui generis* legislation to provide community-based rights over biological resources and associated traditional knowledge. Pakistan has drafted legislation on Access to Biological Resources and Community Rights which aims to protect and support the rights of local (and traditional) communities over biological resources and their related knowledges, innovations and practices (WIPO, 2002). There is also strong support from lobby groups in Malaysia for the introduction *of sui generis* legislation to protect the rights of indigenous people (Nijar 1999).

Despite China's impressive list of legislative measures relating to the protection of traditional knowledge, the Second National Report to the CBD (2001) acknowledges that:

> …the most urgent work for legislation in this field is to formulate the national regulation for accessing to genetic resources and biosafety management and improving the rule of intellectual property right. In particular the respect and maintenance of traditional knowledge, inventions and practice of local communities.

This suggests that China is also considering a *sui generis* legislative response to Article 8(j). Furthermore, the Australian *Our Culture, Our Future: Report on Australian Indigenous Cultural and Intellectual Property Rights* (Janke 1999) recommends that such a *sui generis* system be established as a matter of priority for governments in Australia. It states:

> These measures would enable a more 'holistic' approach to protection and management of indigenous cultural and intellectual property that includes biodiversity-related traditional knowledge, innovations and practices.

2.6.6.1 Regional initiatives

At the regional level, several bodies are working towards the harmonisation of national regimes and the international adoption of *sui generis* legislation to protect traditional knowledge.

The Cusco Declaration (2002) advocates the adoption of a *sui generis* regime, and also promotes international cooperation and information-sharing, and advocating disclosure of the source of genetic material in patent applications. In the Middle East, a Regional Consultation on the Protection of Expressions of Folklore in the Arab States organised by WIPO and UNESCO and the Government of Tunisia in 1999. This international meeting resulted in a declaration supporting the legal protection of folklore and traditional knowledge through the *sui generis* approach. In the Southeast Asian region, ASEAN is working on many levels to address issues relevant to Article 8(j). Firstly, ASEAN is working to harmonise national laws for the protection of plant varieties, in a way which addressed the concerns of developing countries that the UPOV model for the legislative favours commercial entrepreneurs at the

expense of local farmers. Secondly, ASEAN's Framework Agreement on Access to Biological and Genetic Resources which is to be implemented by national legislatures, establishes a regional Clearing House Mechanism to serve as an 'information node' for the reporting of access activities in the region (ASEAN 2000). The Framework Agreement defines biological resources to include traditional knowledge, but provides that a grant of access to biological and genetic resources shall not automatically mean access to traditional knowledge. The Framework establishes arrangements for the equitable benefit-sharing arrangements with indigenous people, and requires evidence of prior informed consent before access to resources can be granted.

2.7 Summary

Part II of this Report has identified and assessed a number of measures and initiatives that are being developed and implemented to protect, promote and facilitate the use of traditional biodiversity related knowledge. It is clear that recognition, for example, of protected and community controlled areas where indigenous peoples and local communities reside is an important development. Where indigenous peoples and local communities are involved in the management of these areas there have been a number of successes in protecting traditional biodiversity related knowledge.

Throughout the regions covered by this Report, a raft of incentive measures is being implemented, most importantly in the development of *sui generis* negotiations. In addition, poverty reduction, strategies, access to benefit sharing strategies, tax exemptions, and collaborative research projects, most successfully linked to *sui generis* recognition, are providing strong motivation for indigenous peoples, local communities, governments and corporations to investigate collaborative approaches to conservation and economic development on the basis of the use of traditional biodiversity related knowledge.

In parallel with the development of incentive measures, a significant investment is being made by international agencies and national governments in capacity building measures to enable indigenous peoples and local communities to become party to agreements on the use of their traditional biodiversity related knowledge. Of central importance are documentation projects and adult education programs.

It is apparent that there are strong developments occurring in the legislative and strategic planning arenas regarding the indigenous peoples and local communities and their capacity to own, use, and benefit from their traditional biodiversity related knowledge. The NBSAPs have mostly now been developed and some nation states are moving to the implementation stage by embedding strategic planning within constitutional and legislative frameworks.

3 Regional recommendations and targets

In recognition of the substantial work already done by the United Nations, other international agencies, indigenous peoples and local communities, this Report acknowledges the *Principles and Guidelines for the Protection of the Heritage of Indigenous Peoples* produced on behalf of the Sub-commission on Prevention of Discrimination and Protection of Minorities of the United Nations Commission on Human Rights. The U.N. reference number of the document is: E/CN.4/Sub.2/1995/26, 22 Nov 1999. It also acknowledges the IUCN Recommendations made to the Sixth Meeting of the Conference of the Parties to the Convention on Biological Diversity (COP6) (The Hague, Netherlands, 7-19 April 2002).

The recommendations contained in this Report reflect directly on the findings of the study and are submitted alongside the information contained in Parts I and II.

3.1 Recomendations and Targets regarding Part I: The state of the retention of traditional biodiversity-related knowledge

It is recommended that
Reliable indictors should be identified and promulgated to enable assessment of traditional biodiversity-related knowledge.

It is recommended that

Agreement should be reached regarding the use of the term ‘indigenous peoples’ so that reliable indicators can be established.

It is recommended that

Distinctions need to be draw between indigenous peoples and local communities for the purposes of Article 8(j).

It is recommended that

- Reliable indictors are established in relation to the retention of traditional estates in land, sea and waterways on which indigenous peoples and local communities rely for their cultural survival and/or subsistence.
- Reliable indicators are established in relation to the state of retention of traditional knowledge throughout Asia and the Middle East. Such indicators should be informed by the dependence of human populations on traditional knowledge and practice for subsistence where appropriate.
- Reliable indicators are established in relation to the state of retention of language diversity that recognise and reflect the correlation between linguistic diversity and biological diversity.
- Reliable indicators are established in relation to the religious beliefs and practices of indigenous peoples and local communities that recognise and reflect the correlation between religious belief and practice and the state of retention of biodiversity-related traditional knowledge.

It is recommended that

The development of an acceptable system of classification of traditional knowledge resources is addressed urgently to contribute to the development of both local and international classification systems. Such classification should be used by countries to assist in the registration of traditional knowledge resources to prevent biopiracy.

It is recommended that

UNESCO, IUCN and other agencies should assist in developing classification systems by seeking the cooperation of ratifying Members, universities and research centres and indigenous peoples and local communities to a worldwide program.

It is recommended that

Threats to the retention of traditional biodiversity-related knowledge be monitored and measured because the economic, cultural and spiritual survival and sustenance of millions of people in Asian and the Middle East depends upon the day-to-day traditional practices of indigenous peoples and local communities.

It is recommended that

International measures should be established and financial commitments made in order to retain the languages, religions and other cultural expressions of indigenous peoples and local communities to reduce the threat of cultural absorption of such people and communities into dominant societies against their will.

It is recommended that

The land and sea tenures of indigenous peoples and local communities are recognised by nation states in order to retain the capacity of indigenous peoples and local communities and nation states to protect traditional biodiversity related knowledge.

It is recommended that

International measures should be established and financial commitments made in order to preserve biological diversity on the traditional estates of indigenous peoples and local communities.

It is recommended that

International measures should be established and financial commitments made to monitor land and sea tenure losses, changes land title arrangements and population transfers that negatively impact on indigenous peoples and local communities, in order to prevent disruption of indigenous peoples and local communities and their ways of life that support traditional biodiversity-related knowledge.

It is recommended that

Special measures should be established and financial commitments made in order to retain traditional biodiversity-related knowledge in post-conflict areas. Such measures should seek to address the particular threats faced by indigenous peoples and local communities living in post-conflict areas and recognise the particular threats posed by the loss of traditional knowledge in these areas.

3.1.1 and 3.1.2 State of traditional knowledge of plant genetic resources, animals and microorganisms for food and agriculture

It is recommended that

International measures should be established and financial commitments made in order to protect traditional biodiversity related knowledge of indigenous peoples and local communities from the selective retention of their traditional knowledge on the basis of economic value alone.

It is recommended that:

Micro-specific local management of indigenous crop varieties should be promoted in order to increase the rational use of local knowledge in agrobiodiversity for sustainable livelihoods.

It is recommended that:

International measures should be established and financial commitments made in order to protect and preserve old cultivars. The lack of financial resources for *in situ* protection of old cultivars should be recognised as a key obstacle to the retention of traditional biodiversity-related knowledge.

3.1.3 State of traditional medicinal knowledge

It is recommended that

An integrated approach to the retention of traditional medicinal knowledge is required in order to ensure productivity and sustainability. The lack of integration between the increased use and the systemic cultivation and preservation of traditional medicinal resources poses a critical threat to the ongoing sustainability of the natural resources on which indigenous peoples and local communities rely.

It is recommended that

Research is undertaken regarding the impacts of over-exploitation of plants and animals used in traditional medicines, with particular attention paid to the impact of that over-exploitation on endangered species.

3.1.4 State of traditional knowledge systems concerning the general and specific ecosystems

It is recommended that

Forests, drylands and steppe, marine and coastal, island mountain and valley, and inland waters ecosystems require ecosystem-specific strategies to ensure the retention of the traditional knowledge and practices of indigenous peoples and local communities.

It is recommended that

Where indigenous peoples and local communities hold communal ownership and/or communally manage ecosystem-specific areas, their capacity to retain governance of the traditional biodiversity related knowledge and practices of these areas should be recognised and protected.

3.1.4.1 Forests

It is recommended that

The critical function of forests as an ecosystem crucible must be recognised. There is an urgent need to

adopt measures and make financial commitments to ensure the retention of forests and the participation of indigenous peoples and local communities in the management and sustainable use of forests and forest resources. The catastrophic effects of deforestation and land-clearing on biodiversity preservation and the retention of traditional knowledge of indigenous peoples and local communities living in forest areas should be recognised.

3.1.4.2 Dryland and steppes ecosystems

It is recommended that

International measures should be established and financial commitments made in order to alleviate the effects of drought and salinity on the livelihoods of indigenous peoples and local communities living in dryland and steppes ecosystems to protect their traditional knowledge.

3.1.4.3 Marine and coastal ecosystems

It is recommended that

Regulation of fishing and other aquaculture industries and activities in marine and coastal ecosystems should recognise and protect the traditional knowledge and practices of indigenous peoples and local communities. International measures to prevent the over-harvesting of fish stocks and the degradation of marine and coastal biodiversity should be implemented.

3.1.4.4 Island ecosystems

It is recommended that

The fragility of island ecosystems is acknowledged. The effects of waste disposal, mining and other commercial enterprises on the livelihoods of indigenous peoples and local communities living on islands require particularly urgent attention. Signatories must ensure that indigenous peoples and local communities initiate and are involved in measures to address the detrimental effects of development activities and unsustainable land use practices on island ecosystems.

3.1.4.5 Mountain and valley ecosystems

It is recommended that

The importance of agroecosystems for the sustenance of indigenous peoples and local communities in mountain and valley ecosystems is recognised. The effect of increased cultivation on the traditional knowledge and practices of indigenous peoples and local communities living in mountain and valley ecosystems requires particular attention.

3.1.4.6 Inland waters

It is recommended that

The critical importance of water for the sustenance of indigenous peoples and local communities should be recognised. International measures, in qualitative and quantitative terms, must be developed and financial commitments made to address water insecurity in terms which pay particular attention to the needs of the indigenous peoples and local communities living in inland water ecosystems.

3.1.5 Knowledge versus practice: state of retention of traditional knowledge concerning practices relevant to the customary management, conservation and sustainable use of biological diversity that are no longer maintained or are at risk of disappearing

It is recommended that

The disenfranchisement of indigenous peoples and local communities should be acknowledged as a key factor contributing to the loss of retention of traditional biodiversity-related knowledge. To ensure the continued viability of traditional knowledge and practices, indigenous peoples and local communities must have control over, and access to, their traditional estates and natural resources.

It is recommended that

Governments should provide funding support and technical assistance to develop and implement biodiversity management strategies under each sector and for each region in order to reduce the risk that certain indigenous and local traditions may no longer be practiced. Without such national initiatives, biodiversity protection will remain weak.

It is recommended that

Governments should enforce measures for the conservation of traditional biodiversity related knowledge as being essential to prevent the continued exploitation of biological resources and traditional knowledge by hostile others. A strong and sustained commitment is required, including a commitment to the provision of adequate resources for law enforcement, the training of field conservation workers and awareness-raising programs to prevent the destructive exploitation of biodiversity and biological resources.

It is recommended that

Governments should desist from removing indigenous peoples and local communities from areas of recognised biodiversity importance, for both commercial and conservationist reasons. Instead nation states and indigenous peoples and local communities should be encouraged to enter into collaborative management partnerships of precious biodiversity regions to ensure the future sustainability of both the natural resources and the traditional biodiversity related knowledge of indigenous peoples and local

communities.

It is recommended that

Incentive measures and capacity building programs to encourage indigenous peoples and local communities to commercially exploit their traditional biodiversity related knowledge should be coupled with an acknowledgement and respect for the intrinsic and intangible values of their traditional knowledge and cultural practices.

It is recommended that

Ensuring the economic efficiency of agricultural practices through development programs should be coupled with an acknowledgement and respect for the traditional knowledge and practices of indigenous peoples and local communities.

3.1.6 Assessing the feasibility of using existing traditional knowledge to maintain customary practices relevant for the management, conservation and sustainable use of biological diversity

It is recommended that

International measures should be established and financial commitments made in order to overcome the dismissal of traditional biodiversity related knowledge and the practices of indigenous peoples and local communities as viable life-ways in the modern world. This must be addressed as a matter of urgency through the active promotion of traditional knowledge and practices by governments, non-governmental and academic organisations.

It is recommended that

International measures should be established and financial commitments made in order to evaluate the importance of the retention of such cultural dimensions as language and religion as being essential to ensuring the continued use of traditional biodiversity-related knowledge.

It is recommended that

Where there is a high retention of biodiversity integrity and/or the retention of traditional land and sea management of traditional estates, strategic management regimes based on indigenous and local principles of governance should be given a vital role in the maintenance of traditional biodiversity-related knowledge and customary practices.

3.2 Recommendations regarding Part II: Identification and assessment of measures and initiatives to protect, promote and facilitate the use of traditional knowledge

It is recommended that

Sui generis protection of traditional biodiversity-related knowledge should be developed by nation states.

It is recommended that

The development of *sui generis* measures for the protection of rights in traditional biodiversity-related knowledge should be recognised and acknowledged as the key strategy for constructive dialogue between indigenous peoples and local communities and nation states. *Sui generis* systems based in legislative (including policy and administrative) measures must cover intellectual property rights, equitable benefit sharing and should incorporate the registration of biodiversity related and associated traditional knowledge.

It is recommended that

Signatories to the CBD develop *sui generis* measures in legislation and administrative policy, including registers of traditional knowledge, seed banks and related documentation, traditional knowledge digital libraries, to enable the protection of traditional biodiversity-related knowledge by providing the means for identifying the original source of information used in patenting and the benefit sharing with the holders of traditional biodiversity-related knowledge.

It is recommended that

National Biodiversity Strategies and Action Plans should be linked to legislative measures to protect, promote and facilitate the use of traditional biodiversity related knowledge.

It is recommended that

Institutional initiatives to integrate biodiversity conservation with other national priorities should include the establishment of a National Biodiversity Authority to administer information and control access to the biodiversity resources of the nation state recognising the particular contribution made to the efforts in biodiversity conservation by indigenous peoples and local communities.

It is recommended that

Regional planning for biodiversity conservation through the development of NBSAPs should be participatory and must include indigenous peoples and local communities.

It is recommended that

Government and corporate accountability in relation to the commercial exploitation of traditional biodiversity-related knowledge must feature in legislative and strategic planning measures and initiatives to protect, promote and facilitate the use of traditional knowledge of indigenous peoples and local communities.
It is recommended that
Governments that condone, tolerate or contribute to biopiracy of traditional biodiversity related knowledge of indigenous peoples and local communities, both within their own nation and elsewhere, should be held accountable under international law.

3.2.1 Regional and national land and sea use practices

It is recommended that

In relation to the management of protected areas and other conservation areas, signatories develop positive government-assisted initiatives to provide funds, expertise, research and other resources to enable devolution of control of project implementation and evaluation to the governance structures of indigenous peoples and local communities.

It is recommended that

Recognition should be given that a representative reserve and off-reserve system to conserve biological diversity may extend across the boundaries of the customary tenure systems of indigenous peoples and local communities and that such transboundary circumstances require the negotiation of cooperative arrangements for conservation management that recognise traditional land tenure and land management regimes and traditional biodiversity-related knowledge and practices.

It is recommended that

Government and NGO programs should support joint management with indigenous peoples and local communities in community conservation initiatives and community-conserved areas.

It is recommended that

International protocols are developed for involvement of NGOs or government agencies in conservation initiatives initiated by indigenous peoples and local communities. International measures should be established and financial commitments made to monitor the role of the NGO sector in providing development services and inputs to indigenous peoples and local communities with regard to land and sea territories management.

It is recommended that

International and national financial commitments should be made to enable more opportunity for dialogue at conferences, forums, though web-based technologies between various stakeholders in the management of land and sea territories. These opportunities should be actively extended to indigenous peoples and local communities to enable them to participate in a full and meaningful way.

It is recommended that

International measures should be established and financial commitments made to monitor the linkage between biodiversity loss and poverty amongst indigenous peoples and local communities.

It is recommended that

Local measures should be established to develop innovative approaches to *in situ* conservation of natural resources, as a key factor in the participation of indigenous peoples and local communities in land and sea territory management.

It is recommended that

Nation states should explicitly address the role and importance of traditional biodiversity related knowledge in biodiversity management.

3.2.2 Incentive measures

It is recommended that

The development of poverty reduction strategies in relation to biodiversity conservation should involve the development of income generation activities for indigenous peoples

and local communities linked, for example, to the management of protected areas, traditional estates and commercialisation of agreed traditional biodiversity related knowledge.

It is recommended that

Benefit-sharing arrangements are developed in agreements supported by legislation to ensure the agreed benefits of the use of traditional biodiversity related knowledge and practices — such as ecotourism revenues or bioprospecting royalties — accrue to the local community and are not taken away by external investors.

It is recommended that

In establishing biodiversity registers, clear agreements must be made between governments and indigenous peoples and local communities regarding the sharing of benefits arising from the utilisation of traditional biodiversity related knowledge. There is a well-documented potential for utilisation initiatives to render traditional biodiversity related knowledge vulnerable to commercialisation, without the traditional knowledge holders receiving flow on benefit from such utilisation and/or commercialisation.

It is recommended that

Capacity building and community education programs must accompany the development of benefit sharing agreements so that indigenous peoples and local communities are in a position to give full and informed consent to such agreements.
Discussions about benefit sharing must make explicit that the consequence of benefit sharing agreements is often that ownership of registered knowledge would also be shared and that a government or corporate signatory might make that traditional biodiversity related knowledge available in the global market to encourage investment capital that would enable research and investigation of opportunities for its commercial exploitation.

It is recommended that

There should be more extensive provision of tax exemptions and collateral benefits to indigenous peoples and local communities that facilitate and promote the use of traditional biodiversity-related knowledge.

It is recommended that

Collaborative research partnerships, skill-sharing and third party research activities should be encouraged in circumstances where such arrangements have positive outcomes for indigenous peoples and local communities.

3.2.3 Capacity-building measures

It is recommended that

Capacity building measures encourage and support the development and use of collaborative agreements in all biodiversity conservation programs to ensure the involvement of indigenous peoples and local communities and safeguard the traditional biodiversity-related knowledge and practices of indigenous peoples and local communities;

It is recommended that

Governments provide capacity building resources for the establishment of cooperative species recovery plans for endangered and vulnerable species of particular significance to indigenous peoples and local communities and the involvement of these communities and the application of their traditional biodiversity-related knowledge in species conservation.

It is recommended that

> International measures should be established and financial commitments made to develop the capacity of nation states and indigenous peoples and local communities to register traditional biodiversity related knowledge in databases, web libraries, People's Biodiversity Registers. This must be undertaken urgently to enable indigenous peoples and local communities to participate as equal partners in the development of their traditional biodiversity related knowledge.

It is recommended that

> International measures should be established and financial commitments made to ensure that the processes of documentation of traditional biodiversity related knowledge that is publicly registered by indigenous peoples and local communities is protected under international law.

It is recommended that

> International measures should be established and financial commitments made to the provision of community education to indigenous peoples and local communities regarding CBD Article 8(j) to enable indigenous peoples and local communities to enter into full and informed agreement regarding access to and use of their traditional biodiversity related knowledge.

It is recommended that

> Community and adult education capacity building programs should be developed in collaborations between indigenous peoples and local communities, NGOs, religious organisations, community and adult educators and legal rights groups to ensure that the use of the traditional biological knowledge of indigenous peoples and local communities in the scientific, commercial and public domains can proceed only with the cooperation and control of indigenous peoples and local communities that hold that knowledge.

It is recommended that

> Indigenous people and non-indigenous researchers need to establish collaborations based on mutual respect, so that the knowledge that emerges from these partnerships enhances our capacity to sustain life on this planet rather than to exploit it.

It is recommended that

Nation states ensure that curricula at all levels of education promote an understanding of the importance of traditional biodiversity-related knowledge and the social and economic benefits of such knowledge and related practices, and an appreciation of the cultural heritage of indigenous peoples and local communities

It is recommended that

- that teachers wanting to include traditional biodiversity related knowledge in their curricula should become familiar with conventions that frame our understanding of the importance of indigenous knowledge systems and traditional ecological knowledge;
- that teachers within Western-based education systems develop skills to ascertain the accuracy of any traditional biodiversity related knowledge brought into science and technology education;
- that reliable documentation processes should be developed by indigenous and non-indigenous peoples working together;
- that protocols should be developed for establishing collaborative learning partnerships; and
- that further work should be undertaken to bring together best practice in relation to raising awareness of indigenous knowledge and traditional ecological knowledge in science and technology education.

3.2.4 Repatriation of objects and associated information to communities of origin

It is recommended that

Stronger links must be made between the CBD and repatriation of objects and associated information to communities of origin, especially when repatriation involves such tangible and intangible property as the traditional biodiversity related knowledge, cultural objects, skeletal remains, and genetic materials of indigenous peoples and local communities that can be clearly linked to the measures afforded under Article 8(j).

3.2.5 Strategic planning for conservation and sustainable use of biological diversity within the context of community development planning

It is recommended that

Adequate financial assistance is made available to nation states to enable them to continue to develop and implement their NBSAPs and associated strategic plans in accordance with the measures afforded under Article 8(j).

3.2.6 Legislative (including policy and administrative) measures

It is recommended that

Ratifying Members of the CBD enact biodiversity legislation which provides for protection of traditional biodiversity-related knowledge of indigenous peoples and local communities through measures such as registration of traditional biodiversity related knowledge in libraries, registries and inventories, formally recognised in statutes and administrative procedures, and the development of other *sui generis* systems of protection.
It is necessary that any *sui generis* system addresses those aspects of traditional biodiversity-related knowledge systems that are not amenable to commodification and commercialisation, for example, natural resource management. If *sui generis* protective measures are relevant only where there is a potential economic benefit, then certain knowledge and practices of indigenous peoples and local communities will be placed in

jeopardy, not least because *sui generis* protective measures would not be extended to them.

It is recommended that

The needs of farmers, fishers and other food producers should be recognised in legislation in order to protect their traditional or customary rights in seed stocks, agricultural and food harvesting practices, including rituals, festivals and community activities.

It is recommended that

Signatories to the CBD amend patent laws to include a provision requiring the disclosure of origin where a patentable process or product has been developed using knowledge of indigenous peoples and local communities. This requirement of disclosure of origin should apply to international patent registration systems as well as in the national context.

It is recommended that

Signatories to the CBD recognise the reliance of indigenous peoples and local communities on their tested knowledge, including customary laws, to protect the misuse of their knowledge and resources.

It is recommended that

Governments take action against local authorities and law enforcers who fail to prevent the unlawful collection of biological resources (for example, without a required permit).

It is recommended that, in the development of such legislation and administrative policy

The informed consent of indigenous peoples and local communities that retain traditional biodiversity-related knowledge be a condition of documentation and registration of such knowledge.

It is further recommended that

Such informed consent should be freely decided by the relevant indigenous peoples and local communities in relation to their traditional biodiversity-related knowledge in accordance with local and/or customary laws.

It is recommended that, in the development of legislation and administrative policy

Provisions for mandatory disclosure of source and geographical origin of the biological material used in the invention while applying for patents is included.

It is recommended that, in the development of legislation and administrative policy

Provisions include the non-disclosure or wrongful disclosure of the same as grounds for opposition and for revocation of the patent, if granted. To prevent patents based on knowledge, which is not always documented, provisions should be developed to include anticipation of invention by available local knowledge, including oral knowledge, as one of the grounds for opposition as also for revocation of patent, if granted.

It is recommended that, in the development of legislation and administrative policy

Formal notification and permit systems should be developed in relation to specimen collection and other bioprospecting activities so that such activities proceed under registration of permits based on the informed consent of relevant indigenous peoples and local communities.

It is recommended that, in the development of legislation and administrative policy

Law enforcement procedures should be developed, based on monitoring and reporting systems, so that penalties are imposed for breaches of permit systems.

It is recommended that, in the development of legislation and administrative policy

It be required that the development of biotechnology and potential profits from traditional knowledge on medicinal plants and animals, animal products, germplasm and genetic material be the subject of access and benefit-sharing contractual agreements to ensure the flow of benefits to indigenous peoples and local communities whose traditional biodiversity-related knowledge has been used in such development.

It is recommended that, in the development of legislation and administrative policy

Ethical codes and protocols are legislated for research and development of traditional biodiversity-related knowledge to ensure that the interests of indigenous peoples and local communities are protected.

It is recommended that, in the development of legislation and administrative policy

To ensure equitable sharing of benefits arising from the use of biological resources and associated knowledge, provisions should be included that stipulate the prior approval of a statutory authority with the specific purpose of protecting traditional biodiversity-related knowledge before their access. While granting approval, such a statutory authority would impose terms and conditions which secure equitable sharing of benefits.

It is recommended that, in the development of legislation and administrative policy

The powers and functions of such a statutory authority should be the imposition of measures to oppose the grant of IPRs in any other country on any biological resource or knowledge associated with such biological resource, obtained from the country of origin.

4 References

4.1 General Books, Papers and Pamphlets

Adimihardja, K. 1992. *Rice and fish: dual function of rice fields among the Kasepuhan people in West Java.* Paper presented at International Symposium on Indigenous Knowledge and Sustainable Development September 20-26, Silang, Cavite, Philippines.

Agrawal, A. 1995. Dismantling the Divide between Indigenous and Scientific Knowledge. *Development and Change* 26(3):413-439.

Ahmed J., Hussain, S. 1998. Community-based natural resource management in northern Pakistan. Gland, Switzerland: IUCN.

Akimichi, T. 1995. Indigenous Resource-Management and Sustainable Development - Case-Studies from Papua-New-Guinea and Indonesia. *Anthropological Science* 103(4):321-327.

Alexander, A.1996. Scientific knowledge and indigenous perceptions of area, weight and space. *Indigenous Knowledge and Development Monitor* 4(3).

Ali shah, M. 2002. A bleak future: women of fishing communities in Pakistan face increasing marginalisation. *Yemaya* 9.

Alino, P.M., Cajipe, G.J.B., Ganzon-Fortes, E.T., Licuanan, W.R.Y., Montano, N.E., Tupas, L.M. 1990. *The use of marine organisms in folk medicine and horticulture: a preliminary study.* SICEN Leaflet 1: Supplement of SICEN Newsletter University of the Philippines, Diliman, Quezon City, Philippines Seaweed Information Centre (SICEN).

Aroa R. K., Riley K.W. (Eds.) 1998. Proceedings of the Asia-Pacific Consultation on Plant Genetic Resources, 27-29 November 1996, IARI, Pusa Campus, New Delhi. New Delhi, India: International Plant Genetic Resources Institute.

ASEAN. 2001. Second ASEAN State of the Environment Report 2000. ASEAN Secretariat, Jakarta.

Australian and New Zealand Environment and Conservation Council (ANZECC). 2001 *Review of the National Strategy for the Conservation of Australia's Biological Diversity.* Canberra, Australia: Environment Australia.

Barth, F. 1993. *Balinese Worlds.* Chicago, USA: University Press.

Batanouny, K.H. 2000. Land-use traditions and indigenous knowledge in the Arab world. *World Conservation* 2.

Battiste, M., Henderson, J. 2000. *Protecting Indigenous Knowledge and Heritage: A Global Challenge.* Purich Publishing Ltd, Saskatchewan, Canada.

Berkes, F., Folke, C., Gadgil, M. 1993. *Traditional ecological knowledge, biodiversity, resilience and sustainability.* Beijer Discussion Paper Series No. 31. Stockholm, Sweden: Beijer International Institute of Ecological Economics.

Berkes, F., Gadgil, M. 1993. Indigenous Knowledge for Biodiversity Conservation. *Ambio* 22(2/3):151-56.

Bernard, J. *Shooting the Sun: Ritual and Meaning in West Sepik.* Washington DC, USA: Smithsonian Institution Press.

Biggelaar, C.D. 1991. Farming systems development: synthesizing indigenous and scientific knowledge systems. *Agriculture and Human Values* 8(1/2):25-36.

Birmingham, D.1998. Learning local knowledge of soils: a focus on methodology. *Indigenous Knowledge and Development Monitor* 6(2).

Bramel-Cox, P.J. Pundir, R.P.S. 1998. Role of ICRISAT in supporting national/regional plant genetic resources activities in the Asia-Pacific region. In R.K. Aroa and K.W. Riley (Eds.), *Proceedings of the Asia-Pacific Consultation on Plant Genetic Resources, 27-29 November 1996*, *IARI, Pusa Campus, New Delhi.* New Delhi, India: International Plant Genetic Resources Institute, pp. 103-112.

Brokensha, D.W., Warren D.M., Werner O. (Eds.) 1980. *Indigenous Knowledge Systems and Development*. Lanham, MD: University Press of America.

Brosmius, J.P. 1997. Endangered Forest, Endangered People: Environmentalist Representations of Indigenous Knowledge. *Human Ecology* 25(1):47-69.

Chambers, P. 1994. Participatory Rural Appraisal: Analysis of Experience. *World Development*, 22(9).

Cobo, J.M. 1986. Study of the Problem of Discrimination against Indigenous Populations. UN Doc.E/CN.4/Sub.2/1986/7/Add.4.

Colchester, M. 1986. Unity and Diversity: Indonesian policy towards tribal peoples. *The Ecologist* 16(2/3):89-98.

Colchester, M. 1995. Indigenous Peoples' Rights and Sustainable Resource Use in South and Southeast Asia. In R.H. Barnes, A. Gray, B. Kingsbury *Indigenous Peoples of Asia* Association for Asian Studies Inc: Ann Arbor, pp.59-76.

Colchester, M. 2000. Indigenous Peoples and Biodiversity Conservation; Sector Review for the Biodiversity Support Program: Global Overview and South and South East Asia Review. Unpublished paper.

Critchley, W.R.S., Reij, C., Willcocks, T. 1994. Indigenous Soil and Water Conservation: A Review of the State of Knowledge and Prospects for Building on Traditions. *Land Degradation and Rehabilitation* 5(4):293-314.

Crucible Group. 1994. People, plants and patents: the impact of intellectual property on trade, plant biodiversity, and rural society. Ottawa: IDRC.

Cultures and Biodiversity Congress (CUBIC). 2000. *Links Between Cultures and Biodiversity.* Proceedings of the Cultures and Biodiversity Congress, 20-30 July, Yunnan, China.

Daes, E. 1996. *Pacific Workshop on the United Nations Draft Declaration on the Rights of Indigenous Peoples.* Paper presented at Conference of the Indigenous Peoples of the Pacific, Suva, Fiji, September 1996.

De Boef, W., K. Wellard. 1993. Cultivating Knowledge: Genetic Diversity, Farmer Experimentation and Crop Research. London, UK: Intermediate Technology Publications.

Delgado, C.; Rosegrant, M., Steinfeld, H., Ehui, S., Courbois, C. 1999. *Livestock to 2020: The Next Food Revolution.* Food, Agriculture and the Environment Discussion Paper No. 28.Washington D.C. International Food Policy Research Institute.

Dutton, R. 1999. *Changing Rural Systems in Oman: The Khabura Project.* London, UK: Kegan Paul International.

Earth Council and Philippine Council for Sustainable Development. 1995. *Weaving the Fabric of Asia's Future: Meeting of National Councils for Sustainable Development in Asia*. Papers from Conference, Manila, Philippines. San José, Costa Rica: Earth Council.

Ferrari, M.F. 2003. Protecting Biodiversity and Indigenous Peoples/Local Communities' Rights: the Challenge in Southeast Asia. IUCN Theme on Indigenous/Local Communities, Equity and Protected Areas (TILCEPA).

Flores, E. 1992. *Community-based coastal fishery management in the Philippines: a review on small island coral reef fishery management.* Paper presented at Workshop on Indigenous Knowledge and Sustainable Development in the Philippines June 24-26, Silang, Cavite, Philippines.

Foster, K.B., Poggie, J.J. 1992. Customary Marine Tenure Practices for Mariculture Management in Outlying Communities of Pohnpei. In R. Pollnac, P. Weeks (Eds.), *Coastal Aquaculture in Developing Countries: Problems and Perspectives*, Kingston, USA: International Centre for Marine Resource Development, University of Rhode Island, pp. 33-53.

Ghai, D. (Ed.) 1994. *Development & Environment: Sustaining People and Nature*. Oxford, UK: Blackwell Publishers.

Gonzalez. R.M.1995. KBS, GIS and documenting indigenous knowledge. *Indigenous Knowledge and Development Monitor* 3(1).

Government of India. 2001. India's Second National Report to the Convention on Biological Diversity (NBSAP-India, New Delhi, India: Ministry of Environment & Forests.

Grimes BF (Ed.) 1992. *Ethnologue: Languages of the World.* 12th edition. Dallas, USA: Summer Institute of Linguistics.

Grimes BF (Ed.) 1996. *Ethnologue: Languages of the World.* 13th edition. Dallas, USA: Summer Institute of Linguistics.

Gupta, A. 1992. Saga of a star fish: participative design of sustainable institutions for natural resource management. Working Paper No. 1077. Ahmedabad, India: Indian Institute of Management.

Gupta, A. 1994. Suggested Ethical Guidelines for Accessing and Exploring Biodiversity. In Traditional Resource Rights: International Instruments for Protection and Compensation for Indigenous Peoples and Local Communities. Gland, Switzerland: IUCN.

Harmon D. 1995. The Status of the World's Languages as Reported in Ethnologue. *Southwest Journal of Linguistics* 14: 1-33.

Harmon, D. 2001. On the Meaning and Moral Imperative of Diversity. In Maffi, L. (Ed.) *On Biocultural Diversity: Linking Language, Knowledge and the Environment.* Washington D.C., USA: Smithsonian Institution Press.

Haynes, R.P.1991. Building on local agricultural knowledge. *Agriculture and Human Values* 3.

Howitt, R., Connell, J., Hirsch, P. (Eds.). 1996. Resources, Nations and Indigenous Peoples: Case Studies from Australasia, Melanesia and Southeast Asia. Oxford, UK: Oxford University Press.

IIRR (International Institute of Rural Reconstruction). 1993. Papers Presented at International Symposium on Indigenous Knowledge (IK) and Sustainable Development. September 20-26, 1992, International Institute of Rural Reconstruction, Silang, Cavite, Philippines.

Inglis, J. (Ed.) 1993. *Traditional Ecological Knowledge: Concepts and Cases.* Ottawa, Canada: International Program on Traditional Ecological Knowledge and the International Development Research Centre.

Inoue, M. 2000. Participatory Forest Management. In Guhardja, E. et al (Eds.) *Rainforest ecosystems of East Kalimantan: El Nino, drought, fire, and human impacts.* Tokyo; London: Springer.

Inter-Commission Task Force on Indigenous Peoples. 1998. *Indigenous Peoples and Sustainability: Cases and Actions.* IUCN, Utrecht, Netherlands: International Books.

Johannes, R.E. (Ed.) 1989. *Traditional Ecological Knowledge: A Collection of Essays*. Gland, Switzerland: IUCN/World Conservation Union.

Johannes, R.E. and Ruddle, K. (Eds.) 1985. *The traditional knowledge and management of coastal systems in Asia and the Pacific.* Papers presented at a UNESCO-ROSTSEA regional seminar held at the UNESCO Regional Office for Science and Technology for Southeast Asia: 5 - 9 December, 1983. Jakarta, Indonesia: UNESCO.

Johnson, M. 1992. Lore: Capturing Traditional Environmental Knowledge. Ottawa, Canada: IDRC.

Kendrik, A. 1993. *The Erosion and Relocation of Local Resource Management Institutions in a Javanese Fishery.* Paper presented at the 4th Annual Meeting of the International Association for the Study of Common Property, June 16, Manila, Philippines.

Kimber, C. 1966. Dooryard gardens of Martinique. *Pacific Coast Geographers* 28:97-118.

Kingsbury, B. 1998. "Indigenous Peoples" in International Law: A Constructivist Approach to the Asian Controversy. *The American Journal of International Law,* 92(3).

Krauss. M. 1992. The World's Languages in Crisis. *Language* 68(1): 4-10.

Kurien, J. 1998. Traditional Ecological Knowledge and Ecosystem Sustainability: New Meaning to Asian Coastal Proverbs. *Ecological Applications* 8 (1). Thiruvananthapuram, India: Centre for Development Studies.

Langton, M. 1994. *Valuing Cultures: Recognising Indigenous Cultures as a Valued Part of Australian Heritage.* Council for Aboriginal Reconciliation Key Issue Paper 3, Canberra, Australia: AGPS.

Langton, M. 1995. Art, wilderness and terra nullius. In Ecopolitics IX: Perspectives on Indigenous People's Management of Environmental Resources: Conference Proceedings. Darwin, Australia: Northern Territory University with NLC.

Langton, M. 1996. What do we mean by wilderness: Wilderness and *terra nullius* in Australian Art. *The Sydney Papers*, 8(1).

Langton, M. 1996. Grandmothers' law, company business and succession in changing Aboriginal land tenure systems. In G. Yunupingu (Ed.), *Our Land is Our Life: Land Rights Past, Present and Future*, Brisbane: Australia: Queensland University Press.

Langton, M. 1997. Estate of mind: the growing cooperation between indigenous and mainstream managers of North Australian landscapes and the challenges for educators and researchers. *Northern Analyst*, 2.

Langton, M. 1998. *Burning Questions: Emerging Environmental Issues for Indigenous Peoples in Northern Australia*. Centre for Indigenous Natural and Cultural Resource Management. Darwin, Australia: Northern Territory University.

Langton, M., Epworth, D., Sinnamon, V. 1998. *Indigenous Social, Economic and Cultural Issues in Land, Water and Biodiversity Conservation.* A Scoping Study for WWF Australia. Volumes One and Two. Centre for Indigenous Natural and Cultural Resource Management. Northern Territory University, Darwin, Northern Territory). Unpublished Report. [posted on CBD Clearing House homepage at http://www.biodiv.org/chm/default.aspx]

Ma Rhea, Z., Rigney, L.I. 2002. Researching with Respect: Supervising Aboriginal or Torres Strait Islander Students. In J. Sillitoe et al *Assisting Research Students from Non-Traditional Backgrounds*. Melbourne, Australia: HERDSA, pp.8-19.

Maffi, L. (Ed.) 2001. *On Biocultural Diversity: Linking Language, Knowledge and the Environment.* Washington D.C., USA: Smithsonian Institution Press.

Mangahas, M.F. 1993. *Indigenous Coastal Resources Management: The Case of Mataw Fishing in Batanes.* University of the Philippines Centre for Integrative and Development Studies. Quezon City, Philippines: UP-CIDS/UP Diliman.

Marsden, D. 1990. Using local knowledge. *Community Development Journal* 25(3):266-271.

Masemann, V. 1990. Ways of Knowing: Implications for Comparative Education. *Comparative Education Review* 34(4):465-73.

Mathias, E. 1994. *Indigenous Knowledge and Sustainable Development.* IIRR Working Paper. Silang, Cavite, Philippines: International Institute of Rural Reconstruction.

Mathias, E. 1995. Recording indigenous knowledge: an overview. In J. Schneider (Ed.), *Indigenous Knowledge in Conservation of Crop Genetic Resources*. Indonesia: CIP-ESEAP/CRIFC.

Matowanyika J., Garibaldi V., Musimwa E. (Eds.) 1995. Indigenous Knowledge Systems and Natural Resource Management in Southern Africa. Harare, Zimbabwe: IUCN.

Maundu, P.1995. Methodology for collecting and sharing indigenous knowledge: a case study. *Indigenous Knowledge and Development Monitor* 3(2).

McNeely et al. 1990. *Conserving the World's Biological Diversity.* Gland, Switzerland; Washington D.C., USA: IUCN, WRI, Conservation International/WWF-US/The World Bank.

Mishra, T.K. 1998. Users Become Managers: Indigenous Knowledge and Modern Forestry. *Economic and Political Weekly* 33(6):262-263.

Moreno-Black, G., Prapimporn, S., Sompong, T. 1994. Women in northeastern Thailand: preservers of botanical diversity. *Indigenous Knowledge and Development Monitor* 2(3) (Special Issue).

Moreno-Black, G., Somnasang, P., Thamthawan, S. 1994. Women in Northeastern Thailand: preservers of botanical diversity. *Indigenous Knowledge and Development Monitor* 2(3).

Morin-Labatut, G., Shahid A. 1992. Traditional environmental knowledge: a resource to manage and share. *Development* 4:24-30.

Munungurritj, N. 1992. Dhimurru Land Management Organisation. *Yutana Dhawu* August 1992.

National Commission for Wildlife Conservation and Development. 2001. *National Biodiversity Strategy and Action Plan, Kingdom Of Saudi Arabia* (Draft). Riyadh, Saudi Araba: National Commission for Wildlife Conservation and Development.

Nietschmann, B.Q. 1992. The Interdependence of Biological and Cultural Diversity. Centre for World Indigenous Studies, Occasional Paper 21, Kenmore WA.

Ninez, V. 1987. Household gardens: Theoretical and policy considerations. *Agricultural Systems* 23:167-186.

Ninnes, P. 2000. Representations of indigenous knowledges in secondary school science textbooks in Australia and Canada. *International Journal of Science Education*. 22(6):603-17.

O'Faircheallaigh, C. 1998. Resource Development and Inequality in Indigenous Societies. *World Development* 26(3):381-394.

Philippine Resource Center for Sustainable Development and Indigenous Knowledge (PHIRCSDIK). 1994. *Indigenous Knowledge and Sustainable Development in the Philippines.* Proceedings of Conference of the Regional Program for the Promotion of Indigenous Knowledge in Asia (REPPIKA) and Philippine Resource Center for Sustainable Development and Indigenous Knowledge (PHIRCSDIK), June 24-26, Silang, Cavite, Philippines.

Pollnac, R., Weeks, P. (Eds.). 1992. *Coastal Aquaculture in Developing Countries: Problems and Perspectives.* Kingston, USA: International Centre for Marine Resource Development, University of Rhode Island.

Posey, D. A. 1990. Intellectual Property Rights and Just Compensation for Indigenous Knowledge. *Anthropology Today* 6(4):13-16.

Posey, D. A. 1994a. International Agreements and Intellectual Property Right Protection for Indigenous Peoples. In T. Greaves (Ed.) *Intellectual Property Rights for Indigenous Peoples: A Sourcebook*. Oklahoma City, USA: SFAA, pp. 223-51.

Posey, D. A. 1994c. Traditional Resource Rights TRR: de Facto Self-determination for Indigenous Peoples. In L. van der Vlist (Ed.) *Voices of the Earth*. Amsterdam, Netherlands: Centre for Indigenous Peoples & International Books, pp. 217-39.

Posey, D. A. 1995. *Indigenous Peoples and Traditional Resource Rights: A Basis for Equitable Relationships?* Oxford, UK: Green College Centre for Environmental Policy and Understanding.

Posey, D. A. and G. Dutfield. 1998. Plants, Patents and Traditional Knowledge: Ethical Concerns of Indigenous and Traditional Peoples. G. v. Overwalle. (Ed.) *Patent Law, Ethics and Biotechnology.* Brussels, Belgium: Bruylant, pp. 109-32.

Posey, D. A., Dutfield, G., Plenderleith, K. 1995. Collaborative Research and Intellectual Property Rights. *Biodiversity and Conservation*, 4(8): 892-902.

Posey, D.A. & Dutfield, G., 1996. Beyond Intellectual Property Rights: Towards Traditional Resource Rights for Indigenous and Local Communities. Ottawa, Canada; Gland, Switzerland: IDRC/WWF.

Posey, D.A. (with contributions by Dutfield, G., Plenderleith, K., da Costa e Silva, E. & Argumedo, A). 1996. Traditional Resource Rights: International Instruments for Protection and Compensation for Indigenous Peoples and Local Communities. Gland: Switzerland: IUCN.

Posey, D.A. 1994b. International Agreements for Protecting Indigenous Knowledge. In V. Sanchez, C. Juma (Eds.) *Biodiplomacy*. Nairobi, Kenya: ACTS, pp. 119-37.

Posey, D.A. 1998. Diachronic Ecotones and Anthropogenic Landscapes: Contesting the Consciousness of Conservation. In W. Balee, (Ed.) *Principles of Historical Ecology.* New York, USA: Columbia University Press.

Prain, G., Fujisaka, S. (Eds.) 1998. Biological and Cultural Diversity: The role of indigenous agricultural experimentation in development. London, UK: Intermediate Technology Publications.

Pye-Smith, C. 1994. *The Wealth of Communities*. Connecticut, USA: Kumarian Press.

Quiroz, C.1994. Biodiversity, indigenous knowledge, gender and intellectual property rights. *Indigenous Knowledge and Development Monitor* 2(3).

Rajan, S., Sethuraman, M. 1997. Traditional veterinary practices in rural areas of Dindigul District, Tamilnadu, India. *Indigenous Knowledge and Development Monitor* 5(3).

Rajasekaran, B., Martin, R.A., Warren, D.M. 1993. A framework for incorporating indigenous knowledge systems into agricultural extension. *Indigenous Knowledge and Development Monitor* 1(3).

Resource Assessment Commission. 1993. *Coastal Zone Inquiry: Final Report*. Canberra, Australia: Resource Assessment Commission.

Ruddle, K. 1993a. External forces and change in traditional community-based fishery management systems in the Asia-Pacific Region. *MAST* (Maritime Anthropological Studies) 6:1-37.

Ruddle, K. 1993b. Local Knowledge in the Future Management of Inshore Tropical Marine Resources and Environments. *Nature and Resources* 29 (4).

Ruddle, K. 1994. Traditional Community-Based Marine Resource Management Systems in the Asia-Pacific Region: Status and Potential. Manila, Philippines: International Centre for Living Aquatic Resources Management (ICLARM).

Ruddle, K., Hviding, E., Johannes, R. E. 1992. Marine resources management in the context of customary tenure. *Marine Resource Economics* 7:249-73.

Ruddle, K., Johannes, R. (Eds.). 1990. Traditional Marine Resource Management in the Pacific Basin: an Anthology. Jakarta, UNESCO-ROSTSEA.

Scoones, I., Thompson, J. (Eds.) 1994. Beyond farmer first: Rural people's knowledge, agricultural research and extension practice. London, UK: Intermediate Technology Publications.

SEARICE. 1996. *Indigenous Knowledge and Farmers` Rights*. Quezon City, Philippines: SEARICE.

Setyawati, I. 1996. Environmental variability, IK and the use of rice varieties *Indigenous Knowledge and Development Monitor* 4(2).

Sharpe, N. 1996. *Reimagining Sea Space in History and Contemporary Life: Pulling Up Some Old Anchors*. Darwin, Australia: North Australia Research Unit, Australian National University.

Siar, S.V., Ortega, R.S., Babol, A.S. 1992. *Learning from fishers: Indigenous knowledge and SEAFDEC'S pilot seafarming and searanching project.* Paper presented at International Symposium on Indigenous Knowledge and Sustainable Development September 20-26,Silang, Cavite, Philippines.

Sillitoe, P. (Ed.) 2002. *Participating in Development: Approaches to indigenous knowledge* Alan Bicker and Johan Pottier. London, UK; New York, USA: Routledge.

Sillitoe, P. 1998. The Development of Indigenous Knowledge: A New Applied Anthropology. *Current Anthropology*, 39(2):223-52.

Sillitoe, P. 2000. Indigenous knowledge development in Bangladesh: Present and Future. Dhaka, Bangladesh: University Press.

Simpson, T. 1997. *Indigenous Heritage and Self-Determination: the Cultural and Intellectual Property Rights of Indigenous Peoples.* Forest Peoples Programme, Greenland Home Rule Government, IUCN-Netherlands, International Working Group for Indigenous Affairs, Copenhagen, Netherlands: IUCN.

Solow, J., Jonjuabsong, L., Hwai-Kham, A. 1991. *NGO-government interaction in rice-fish farming and other aspects of sustainable agricultural development in Thailand.* London Overseas Development Administration. London, UK: Agricultural Administration (Research and Extension) Network.

Soselisa, H. 1996. Development and Sea Rights in Garogas East Seram. In D. Mearns. and C. Healey (Eds.), *Remaking Malaku: Social Transformations in Eastern Indonesia*. Special Monograph No. 1. Darwin Australia: Centre for Southeast Asian Studies, Northern Territories University, pp. 27-38.

Steinmetz, R. 1999. The Ecological Science of the Karen in Thung Yai Naresuan Wildlife Sanctuary, Western Thailand. In M. Colchester , C. Erni. (Eds.) *Indigenous Peoples and Protected Areas in South and Southeast Asia: From Principles to Practice.* IWGIA Document 97. Copenhagen, Denmark: IWGIA.

Stevens, S., de Lacey, T. (Eds.) 1997. Conservation Through Cultural Survival: Indigenous Peoples and Protected Areas. Washington DC, USA: Island Press.

Suzuki, D., Knudtson, P. 1992. *Wisdom of the Elders.* Toronto: Stoddart Publishing Co.

Tabor, J.A. 1994. Using indigenous knowledge, remote sensing and GIS for sustainable development. *Indigenous Knowledge and Development Monitor* 2(1).

Taylor, P. 1995. Caring For Country Strategy: An Indigenous Approach to Regional and Environmental Programs. Darwin, Australia: Northern Land Council.

Teasdale, G.R., Ma Rhea, Z. (Eds.). 2000. *Local Knowledge and Wisdom in Higher Education*. UK: Elsevier Pergamon.

Teasdale, G.R., Teasdale, J.I. 1992. *Voices in a Seashell: Education, Culture, and Identity*. Suva, Fiji: UNESCO/University of the South Pacific.

Thackway, R., Cresswell, I.D. 1995. An interim biogeographic regionalisation of Australia: A framework for establishing the national system of reserves, Canberra, Australia: Australian Nature Conservation Agency.

Thackway, R., Szabo, S., Smyth, D. 1996. Indigenous protected areas: A new concept in biodiversity conservation. In *Biodiversity Broadening the debate: The beat goes on*. Canberra, Australia: Australian Nature Conservation Agency.

Thaman, K.H. 1995. Concepts of Learning, Knowledge and Wisdom in Tonga, and Their Relevance to Modern Education. *Prospects* 24(4):723-34.

Tindale, N. 1974. *Aboriginal Tribes of Australia.* Berkeley/Los Angeles, USA; London, UK: University of California Press and Australia: Australian National University Press.

Ulluwishewa, R. 1991. Soil fertility management of paddy fields by traditional farmers in the Dry Zone of Sri Lanka. *Journal of Sustainable Agriculture* 1(3):95-106.

Ulluwishewa, R. 1993. *Indigenous practices of aquatic resource management in the dry zone of Sri Lanka.* Paper presented at Pithecanthropus Centennial "Human Evolution in its Ecological Context" Conference, June 26-July 1, Leiden, Netherlands.

Wajid Adil, A. 2000. *National Biodiversity Strategies and Action Plans (NBSAP) for Afghanistan.* Paper given at the 1st Workshop on National Biodiversity Strategies & Action Plans in Northeast and East Central Asia, Experiences and Lessons, 26-28 April, Beijing, China.

Warren, D.M. 1991. Indigenous agricultural knowledge systems and development. *Agriculture and Human Values* 8(1/2).

Warren, D.M. 1991. Using indigenous knowledge for agricultural development. *World Bank* Discussion Paper 127.

Warren, D.M. 1993. Using indigenous knowledge for agriculture and rural development: current issues and studies. *Indigenous Knowledge and Development Monitor* 1(1):7-10.

Warren, D.M., Blunt P. (Eds.) 1996. *Indigenous Organizations and Development.* London, UK: Intermediate Technology Publications.

Warren, D.M., Rajasekaran B. 1994. IK for socioeconomic development and biodiversity conservation: the Kolli Hills (South India). *Indigenous Knowledge and Development Monitor* 2(2).

Warren, D.M., Slikkerveer, L.J., Brokensha, D. 1995. *The Cultural Dimension of Development: Indigenous Knowledge Systems.* London, UK: Intermediate Technology Publications.

Warren, D.M., Slikkerveer, L.J., Titilola, S.O. 1989. *Indigenous Knowledge Systems: Implications for Agriculture and International Development.* Ames, USA: Technology and Social Change Program, Iowa State University.

Whimp, K. (Ed.), Forthcoming. *Intellectual, Biological, and Cultural Property Rights in Papua New Guinea.* Boroko, Papua New Guinea: National Research Institute

Wilkinson, J.C. 1977. Water and Tribal Settlement in South-East Arabia. A Study of the Aflaj of Oman, Oxford, UK: Clarendon Press.

WIPO 2002. Inventory of existing online databases containing traditional knowledge documentation data. WIPO Document No: WIPO/traditional knowledge F/IC/3/6/-.

Woodley, E. 1991. Indigenous ecological knowledge systems and development. *Agriculture and Human Values* 8(1/2):173-178.

World Rainforest Movement. 2001. The Vanishing Forest Biodiversity of Bangladesh. *WRM Bulletin*, 44.

Wu, N. 1998. Indigenous knowledge of yak breeding and cross-breeding among nomads in western Sichuan, China. *Indigenous Knowledge and Development Monitor* 6(1).

Wurm, S. 2001. Atlas Of The World's Languages In Danger Of Disappearing. UNESCO.

WWF-India. 2003. Relevance of Certification to the Wood Carving Industry in India, Forest and Biodiversity Conservation Division. New Delhi, India: WWF-India.

Zwahlen, R. 1996. Traditional methods: a guarantee for sustainability? *Indigenous Knowledge and Development Monitor* 4(3).

4.2 Web based resources

General

Abu-Ghazaleh Intellectual Property. n.d. *Intellectual Property Registration in Arab Countries* at http://www.agip.com

ASEAN. 2000. *Framework Agreement on Access to Biological and Genetic Resources* at http://www.grain.org/brl/region-asia-brl-en.cfm

ASEAN. 2001. *Population at a Glance* at http://www.asean.or.jp/eng/general/base/glance.html

Biowatch South Africa. 2002. *Biopiracy - Ten Years Post-Rio.* Proceedings of the South-South Biopiracy Summit, 23-23 August 2002, Johannesburg, South Africa at http://www.biowatch.org.za/

Campilan, D.M. 2002. *The importance of local knowledge in conserving crop diversity,* SciDevtNet, http://www.scidev.net/dossiers/index.cfm?fuseaction=policybrief&policy=34&dossier=7

Cusco Declaration. 2002. at http://www.comunicadandina.org/ingles/document/cusco29-11-02.htm

Dutfield, G. (Ed.) *Annotated Bibliography of Publications Relating to Indigenous Peoples and Traditional Resource Rights* at http://users.ox.ac.uk/~wgtrr/bib1.htm

Dutfield, G. 2002. *What are Traditional Resource Rights?* at http://users.ox.ac.uk/~wgtrr/trr.htm

Ethnologue: Languages of the World at http://www.ethnologue.com/#MQT

FAO. 2000. Asia and the Pacific: National Forestry Programmes: Update 34 at http://www.fao.org/DOCREP/003/X6900E/x6900e00.htm#Contents

Glowka, L. Pisupati, B. & de Silva, S. 2001. (Eds.) *Access to Genetic Resources and Traditional Knowledge: Lessons from South and Southeast Asia.* Proceedings of the South and Southeast Asia Regional Workshop on Access to Genetic Resources and Traditional Knowledge at http://www.rbp-iucn.lk/bkabs.html

GRAIN, Kalpavriksh. 2002. *Traditional Knowledge of biodiversity in the Asia-Pacific* at http://www.grain.org/publications/tk-asia-2002-en-p.cfm

GRAIN. 2003. *Biodiversity Rights Legislation,* http://www.grain.org/brl/index-en.cfm

GRAIN. 2003. *Signposts to Sui Generis Rights' Resource Materials* at http://www.grain.org/publications/signposts-en-p.htm

Gupta, A. n.d. *People's Knowledge for Survival: Grassroots Innovations for Sustainable Natural Resource Management.* SRISTI website at http://csf.colorado.edu/sristi/papers/fad.html

Gupta, A. n.d. Rewarding Creativity for Conserving Diversity in Third World: Can IPR Regime Serve the Needs of Contemporary and Traditional Knowledge Experts and Communities in the Third World? SRISTI website at http://csf.colorado.edu/sristi/papers/cottier.html

ICARDA. 2001. Sustainable Management of Natural Resources and Improvement of Major Production Systems of the Arabian Peninsula: Work Plan 2000-2001 at http://www.icarda.cgiar.org/APRP/html/Publications/Right/Workplan.html?%23PROTECTED%20AGRICULTURE

International Center for Research in Agroforestry (ICRAF) at http://www.ciesin.org/IC/icraf/ICRAF.html

International Labour Organisation. 1989. *Convention (No 169) Concerning Indigenous and Tribal Peoples in Independent Countries* at http://www.ciesin.org/IC/icraf/ICRAF.htmlInternational Potato Centre website at http://www.cipotato.org/data/Index.htm

IUCN. 2003. *Biodiversity Economics Library* at http://biodiversityeconomics.org/

Kroma, S. 1995. *Popularising science education in developing countries through indigenous knowledge* at http://www.nuffic.nl/ciran/ikdm/3-3/articles/kroma.html

Linguistic Diversity Issues: Asia. Terralingua at http://www.terralingua.org/OrgsAsia.html

Maffi, L. 1998. *Linguistic and Biological Diversity: the inextricable link.* Terralingua Discussion Paper, No. 3 at http://www.terralingua.org/

Ma Rhea, Z. 2002. *Raising Awareness of Indigenous Knowledge in Science and Technology Education* at http://www.scidev.net/dossiers/indigenous_knowledge/ikpolicy_rhea.html

Medicinal and Aromatic Plants Program in Asia (MAPPA) at http://www.idrc.ca/saro/MAPPA.html

Nijar, G.S. 1999. *Sui generis law for plant varieties: preserving the knowledge and creativity of traditional breeders - a Third World view*, Third World Network at http://www.twnside.org.sg/title/sui-cn.htm

Pezo, D. A., Douglas Gray, G. and Somkiat Saithanoo 2002. Improving Small-scale Crop/Livestock Systems in Southeast Asia through the CASREN Network. *Upward Fieldnotes,* June and December 2002:19-20 at http://www.eseap.cipotato.org/upward/Newsletter/Fieldnotes-Vol11.pdf

Posey, D.A. 2001. Biological and Cultural Diversity: The Inextricable, Linked by Language and Politics. Terralingua at http://www.terralingua.org/

Ramsar Convention on Wetlands. 2001. *The Ramsar Convention's Small Grants Fund 2001 Allocations Report* at http://www.ramsar.org/key_sgf01.htm

Rajasekaran, B. n.d. An indigenous duck-fish production system in South India: Impact on food and nutritional security. Draft paper for the Consortium for International Earth Science Information Network (CIESIN) at http://www.ciesin.org/docs/004-200/004-200.html

Simon, B.S. 2000. Global Steps to Local Empowerment in the Next Millennium: An Assessment of UNESCO's 1989 Recommendation on the Safeguarding of Traditional Culture and Folklore at http://www.folklife.si.edu/unesco/

Stoval, H. 1998. *Environmental Legislation in the Middle East* at http://www.stovall-law.com/enviro.htm

Tauli-Corpuz, V. n.d. *Biotechnology and Indigenous Peoples* at http://www.twnside.org.sg/title/tokar.htm

Terra Lingua website at http://www.terralingua.org/

UNEP. 2001. *Global Biodiversity Outlook* at http://www.biodiv.org/gbo/gbo-pdf.asp

UNESCO. 2002. *Teaching and Learning for a Sustainable Future* at http://www4.gu.edu.au/ext/unesco/

UNESCO. 2003. *UNESCO Red Book of Endangered Languages* at http://tooyoo.l.u-tokyo.ac.jp/Redbook/

WIPO & UNEP. 2000. The Role Of Intellectual Property Rights In The Sharing Of Benefits Arising From The Use Of Biological Resources And Associated Traditional Knowledge: Selected Case Studies. Submitted to the Executive Secretary of the Convention on Biological Diversity for consideration at the Fifth Conference of the Parties to the Convention on Biological Diversity, held in Nairobi, Kenya, May 15 to 26, at http://www.wipo.org/globalissues/documents/pdf/cs_oct_2000.pdf

WIPO. 2002. Questionnaire on Databases and Registries Related to Traditional Knowledge and Genetic Resources. WIPO Document No WIPO/GRTKF/IC/Q.4 at http://www.wipo.int/globalissues/questionnaires/ic-q4/index.html

World Bank. *Indigenous Knowledge for Development Program* at http://www.worldbank.org/afr/ik/index.htm

World Water Council. 2003. *Assessing Challenges, Initiating Change in World Water Actions: Making Water Flow for All, Forum Edition – Online*. 3rd World Water Forum at http://www.worldwatercouncil.org/wwa_contents.shtml

Wurm, S. A. Tsuchida, S. 2003. *Endangered Languages in Asia and Pacific* at http://www.tooyoo.l.u-tokyo.ac.jp/Redbook/AsiaPacific/AP_index.cgi

Afghanistan

Afghani Seed Collections Reported Lost. Future Harvest at http://www.futureharvest.org/news/afghan_gene.shtml

Afghanistan Demonstrations for community-based change at http://www.future.org/PAGES/7_AFGHANISTAN/afghanistan_overview.html

FAO. 2003. *Representation in Afghanistan* at http://www.fao.org/world/afghanistan/ICARDA. 2002. Rebuilding Agriculture in Afghanistan *ICARDA News* 4 September 2002 at http://www.icarda.cgiar.org/Afghanistan/icarda%20news/ground%20up.htm

ICARDA, 2003. *Future Harvest Consortium to Rebuild Agriculture in Afghanistan* at http://www.icarda.cgiar.org/afghanistan/Pdf/NA_Horticulture.pdf

National Biodiversity Strategies and Action Plans for Afghanistan at http://bpsp-neca.brim.ac.cn/calendars/workshop-1/8.html

UNEP (United Nations Environment Program). 2003. *UNEP Afghanistan post-conflict environment assessment report.* Switzerland: UNEP at http://postconflict.unep.ch/afghanistan/report/afghanistanpcajanuary2003.pdf

Australia

AIPPI (Association Internationale pour la Protection de la Propriété Intellectuelle). 2000. *Report on Q159: The need and possible means of implementing the CBD into Patent Laws* at http://www.aippi.org/reports/q159/gr-q159-Australia-e.htm

Clyne, M., Kipp, S. *Linguistic Diversity in Australia, Population and Place.* Centre for Population and Urban Research, Monash University, at http://elecpress.monash.edu.au/pnp/free/pnpv5n3/kipp.htm

Co-operative Research Centre for Aboriginal and Tropical Health website at http://www.ath.crc.org.au/crc/

Environment Australia at http://www.ea.gov.au

Environment Australia. 2002. Understanding the Nationally Consistent Approach for Access and the Utilisation of Australia's Native Genetic and Biological Resources at http://www.ea.gov.au/biodiversity/science/access/nca/pubs/understanding.pdf

First National report to the Convention on Biological Diversity at http://www.biodiv.org/doc/world/au/au-nr-01-en.pdf

Fourmile, H. 2000. Appendix 10: Indigenous interests in biological resources in Commonwealth areas -- synthesis of submissions and related information. *Commonwealth Public Inquiry: Access to Biological resources in Commonwealth Areas* Report commissioned for Environment Australia at http://www.ea.gov.au/biodiversity/science/access/inquiry/appendix10.html

Implementation of Article 8 (j) and related articles of the Convention on Biological Diversity: Case Studies from the Australian Government at http://www.biodiv.org/world???scbd-17-en.pdf

Janke, T. 1999. *Our Culture, Our Future: Report on Australian Indigenous Cultural and Intellectual Property Rights*. Report commissioned by the Australian Institute of Aboriginal and Torres Strait Islander Studies and the Aboriginal and Torres Strait Islander Commission (ATSIC) at http://www.icip.lawnet.com.au/frontpage.html

Kennedy, M., Glanznig, A. 2002. Australia. In J. Carew-Reid (Ed.) *Biodiversity Planning in Asia: A Review of National Biodiversity Strategies and Action Plans (NBSAPs),* IUCN at http://www.icem.com.au/bioplan/australia.pdf

Kennett, R., Duff, G., Guinea, M., Hill, G. (Eds.) 1997. Marine Turtle Conservation and Management in Northern Australia. Proceedings of a workshop held at the Northern Territory University, Darwin, Australia. Darwin, Australia: Centre for Indigenous Natural and Cultural Resource Management, Northern Territory University.

National Biodiversity Strategy and Action Plan at http://www.ea.gov.au/biodiversity/publications/strategy/index.html

Native Forest Network. [date]. *Australia's Implementation of the Forest-Related Aspects of The Convention on Biological Diversity* at http://www.nfn.org.au/fcbd/frac4.html

Natural Resource Management Ministerial Council. 2002. *Nationally Consistent Approach For Access to and the Utilisation of Australia's Native Genetic and Biochemical Resources* at http://www.ea.gov.au/biodiversity/science/access/nca/pubs/nca.pdf

Northern Land Council. 2003. *Caring for Country Unit* at http://www.nlc.org.au/html/care_land.html

Second National report to the Convention on Biological Diversity at http://www.biodiv.org/doc/world/au/au-nr-02-en.pdf

Thematic Report on Alien and Invasive Species to the Convention on Biological Diversity at http://www.biodiv.org/doc/world/au/au-nr-ais-en.pdf

Thematic Report on Forest Ecosystems to the Convention on Biological Diversity at http://www.biodiv.org/doc/world/au/au-nr-fe-en.pdf

Voumard, J. 2000. *Commonwealth Public Inquiry: Access to Biological resources in Commonwealth Areas.* Inquiry Commissioned for Environment Australia at http://www.ea.gov.au/biodiversity/science/access/inquiry/pubs/abrca.pdf

Bangladesh

The Independent. 2002. Loss of Biodiversity threatens 5 categories of fauna. *The Independent (Internet Edition)* 30 December, http://independent-bangladesh.com/news/dec/30/30122002mt.htm#A5

Bhutan

Biodiversity Action Plan for Bhutan 1997 at http://www.biodiv.org/doc/world/bt/bt-nbsap-01-en.pdf

First National Report to the Convention on Biological Diversity at http://www.biodiv.org/doc/world/bt/bt-nr-01-en.pdf

IDRC Project 040301. *Wetlands production Systems Bhutan* at http://network.idrc.ca

IDRC Project 100392. *Enhancing productivity through Integrated Natural Resource Management* at http://network.idrc.ca

Cambodia

National Biodiversity Strategy and Action Plan at http://www.biodiv.org/doc/world/kh/kh-nbsap-01-en.pdf

Oum, P. 2002. Cambodia. In J. Carew-Reid (Ed.) *Biodiversity Planning in Asia: A Review of National Biodiversity Strategies and Action Plans (NBSAPs),* IUCN at http://www.icem.com.au/bioplan/cambodia.pdf

China

Batbold, D., Laurie, W. A. 2002. Mongolia. In J. Carew-Reid (Ed.) Biodiversity Planning in Asia: A Review of National Biodiversity Strategies and Action Plans (NBSAPs), IUCN at http://www.icem.com.au/bioplan/mongolia.pdf

Biodiversity Conservation Action Plan 1994 at http://www.bpsp-neca.brim.ac.cn/books/actpln_cn/index.html

Centre for Biodiversity and Indigenous Knowledge. n.d. *Construction of a Protective Forest System on the Upper Reaches of the Yangtze River* at http://cbik.org.cn and http://www.yn.gov.cn

China Biodiversity at http://www.zhb.gov.cn/english/biodiv/chm.htm

China's Biodiversity: A Country Study at http://www.bpsp-neca.brim.ac.cn/books/cntrysdy_cn/index.html

Constitution of Peoples' Republic of China 1982 at http://www.chinatoday.com/law/no1law.htm Department of Nature and Ecology Conservation at http://www.zhb.gov.cn/english/SEPA/dept-NEC.htm

IUCN. n.d. *Yunnan Initiative* at http://www.iucn.org/themes/spg/New/abstracts/yunnan.pdf

Lessons Learnt in the Implementation of the BSAP at http://www.bpsp-neca.brim.ac.cn/calendars/workshop-1/9.html

National Report on China's Implementation of the Convention on Biological Diversity. Chapter II at http://www.bpsp-neca.brim.ac.cn/books/ntlrpt/chapter22.2.-2.3.html#Establishment%20of%20Policy%20Framework

National Report on the Implementation of the Convention on Biological Diversity at http://www.bpsp-neca.brim.ac.cn/books/ntlrpt/content.html

National Report of the State of the Environment in China 2001 at http://www.zhb/gov.cn/english/COE/soechina2001/english/2-biodiversity.htm

Second National Report on Implementation of the Convention on Biological Diversity 2001 http://www.biodiv.org/doc/world/cn/cn-nr-02-en.pdf

State Administration of Traditional Chinese Medicine People's Republic of China at http://www.satcm.gov.cn/english_satcm/eindex.htm

State Environment Protection Administration of China at http://www.zhb.gov.cn/english

Sustainable Livelihoods Project. Kunming Institute of Botany, Chinese Academy of Sciences, Mongolia. Reported by World Bank at http://www-wds.worldbank.org/servlet/WDS_IBANK-Servlet?pcont=details&eid=000094946_02050404111839

Wang, S., Wang, X., Xie, Y., Jin, J., Chen, C., Wang, Z., Qing, J. 2002. China. In J. Carew-Reid (Ed.) *Biodiversity Planning in Asia: A Review of National Biodiversity Strategies and Action Plans (NBSAPs),* IUCN at http://www.icem.com.au/bioplan/china.pdf

India

Anuradha, R.V. n.d. *Sharing with the Kanis: A case study from Kerala, India.* http://www.biodiv.org/doc/case-studies/cs-abs-kanis.pdf

Aruna Kumara, V.K. Anand, A.S. 1999. A mango competition. *Compass Newsletter*, October 1999, http://www.etcint.org/PDF/COMPAS%20Newsletter/No2/28-29-kpp.pdf

Cultural Richness of Green Pharmacy. Paper produced by the Community (or People's) Biodiversity Registers at 'http://compas-network.org/english/dloadz/nl2/link1.pdf

Gorjestani, N. 2000. Indigenous Knowledge for Development: Opportunities and Challenges. World Bank at http://www.worldbank.org/afr/ik/ikpaper_0102.pdf

Government of Sikkim. 2001. *Rathong Chu Valley: Phase 1 Project Report.* National Biodiversity Strategy and Action Plan at http://www.geocities.com/nbsap_sikkim/FPR.htm

Health Heritage Test Database at http://guest:guest@ipdl.wipo.int/en/search/tkdl/search-bool.html

Honeybee Network. Knowledge Network for Augmenting Grassroots Innovations at http://www.honeybee.org/

India: Country Case Study. 2002. Regional workshop on indigenous practices of sustainable land and resource management in Asian highlands, Chiang Mai, December 2-5 at http://www.indigenous-mountains.org/india.pdf

International Fund for Agricultural Development (IFAD). 2001. *Livelihood Security Project for Earthquake-Affected Rural Households in Gujarat.* Approved Project (1210) for India at http://www.ifad.org/operations/projects/regions/PI/des/IN.htm

National Biodiversity Strategy and Action Plan at http://sdnp.dehli.nic.in/nbsap

National Innovation Foundation (NIF) at http://www.nifindia.org/

Navdanya. n.d. *Conservation of traditional crop diversity through religious practices.* SNDP at http://sdnp.delhi.nic.in/nbsap/themes/culture/roleofire.html

North Eastern Region Community Resource Management Project for Upland Areas at http://www.ifad.org/operations/projects/regions/PI/des/IN.htm

Orissa Tribal Empowerment and Livelihoods Programme at http://www.ifad.org/operations/projects/regions/PI/des/IN.htm

Statement of the National Workshop on Biodiversity and Adivasi/Indigenous Peoples, New Delhi, India, 2001 at http://sdnp.delhi.nic.in/nbsap/associatedactivities/adivasisworkshop.html

Taneja, B., Kothari, A. 2002. India. In J. Carew-Reid (Ed.) *Biodiversity Planning in Asia: A Review of National Biodiversity Strategies and Action Plans (NBSAPs),* IUCN at http://www.rbp-iucn.lk/books/nbsap/india.pdf

Thematic Report on Access and Benefit Sharing to the Convention on Biological Diversity at http://www.biodiv.org/doc/world/in/in-nr-abs-en.pdf

Traditional Knowledge Digital Library at http://www.wipo.int/globalissues/databases/tkportal/presentations/indiatkdl.pdf

Indonesia

Alcorn, J.B. Royo, A.G. (Eds.) 2000. *Indigenous Social Movements and Ecological Resilience: Lessons from the Dyak of Indonesia* at http://www.worldwildlife.org/bsp/publications/asia/resilience/resilience.pdf

Baines, G. Hendro, M. 2002. Indonesia in J. Carew-Reid (Ed.) *Biodiversity Planning in Asia: A Review of National Biodiversity Strategies and Action Plans (NBSAPs),* IUCN at http://www.rbp-iucn.lk/books/nNBSAP/Indonesia.pdf

Biodiversity Action Plan for Indonesia 1993 at http://www.biodiv.org/doc/world/id/id-nbsap-01-p1-en.pdf

Campilan, D. 2002. *Sweet Potato Research- the importance of local knowledge in conserving crop diversity.* SciDevNet at http://www.scidev.net/Dossiers/index.cfm?fuseaction=policybrief&Dossier=7&policy=34

East Bali Water Project at http://www.westminster.iinet.au/world/eastbali/eastbali.html

Erdelen, W., Adimihardja, K. Moesdarsono, H. Sidik. 1999. Biodiversity, traditional medicine and the sustainable use of indigenous medicinal plants in Indonesia. *Indigenous Knowledge and Development* Monitor 7(3) at http://www.nuffic.nl/ciran/ikdm/7-3/erdelen.html

FAO. n.d. *The Impact of Social and Environmental Change on Forest Management: A Case Study from West Kalimantan, Indonesia,* FAO Community Forestry Case Study 8 at http://www.fao.org/forestry/fon/fonp/cfu/pub/en/cs/cs08/cs0801-c.stm

First Report to the Convention on Biological Diversity at http://www.biodiv.org/doc/world/id/id-nr-01-en.pdf

Fuglie, K. Piggott, R. 2003. *Agricultural Research and Development Policy in Indonesia* at http://www.eseap.cipotato.org/MF-ESEAP/FI-Library/Indonesia%20-AgResearch-2003Apr.pdf

Indonesian Resource Centre for Indigenous Knowledge (INRIK) at http://www.geocities.com/inrik/

Pramono, E. 2002. *Commercial Use of TK and Medicinal Plants in Indonesia*. Submitted for Multi-Stakeholder Dialogue on Trade, Intellectual Property & Biological Resources in Asia 2002 at http:///www.ictsd.org/dloque/2002-04-19/Pramono.pdf

UNESCO, 2000. Reducing megacity impacts on the coastal environment – Alternative livelihoods and waste management in Jakarta and the Seribu Islands. *Coastal Region and Small Island Papers* 6, Paris, France: UNESCO at http://www.unesco.org/csi/pub/papers/mega7.htm

WIPO. 2003. *Survey on Existing Forms of Intellectual Property Protection for Traditional Knowledge:* Indonesian response at http://www.wipo.org/globalissues/questionnaires/ic-2-5/index.html

Iran

GEF/UNDP. 1997. *Conservation of Biodiversity in the Central Zagros Mountain Forests and Steppe.* Project Description at http://www.gefonline.org/ProjectDocs/Biodiversity/Iran-Central%20Zagros%20Mountain%20Forests/Zagros%20CP%2028-06-2001.doc

National Biodiversity Strategy and Action Plan at http://www.biodiv.org/world/map.asp?lg=0&ctr=ir

National Report to the First Conference of the Parties to the Convention to Combat Desertification (UNCCD) 1997 at http://www.unccd.int/cop/menu.php

Second National Report to the Conference of the Parties to the Convention on Biological Diversity by Islamic Republic of Iran at http://www.biodiv.org/world/map.asp?lg=0&ctr=ir

Shahvali, M., Moinizadeh, H. Ardekani, A. 2000. Local poultry management practices in southwest Iran. *Indigenous Knowledge and Development Monitor* 8(3) at http://www.nuffic.nl/pdf/ciran/0011.pdf

Thematic Report on Forest Ecosystems for the Convention on Biological Diversity by the Islamic Republic of Iran at http://www.biodiv.org/world/map.asp?lg=0&ctr=ir

WaterHistory.org at http://www.waterhistory.org/histories/qanats/

Iraq

UNEP. 2003. *Desk Study on the Environment in Iraq* at http://www.iraqfoundation.org

Israel

First National Report to the Convention on Biological Diversity at http://www.biodiv.org/world/reports.asp?t=ap

Levy, A., Aynalem, H. 1997. *Israel Gene Bank.* Agricultural Research Organisation, Institute of Field and Garden Crops, Ministry of Agriculture and Rural Development at http://www.agri.gov.il/Depts/GeneBank/Genebank.html

Japan

Basic Law on Intellectual Property (*Law No 122 of 2002*) at http://www.kantei.go.jp/foreign/policy/titeki/hourei/021204kihon_e.html

Development of the National Biodiversity Strategy of Japan 2002 at http://www.biodic.go.jp/cbd/outline/rev-unedited.pdf

First National Report 1997 at http://www.biodiv.org

Lake Biwa Research Institute at http://www.lbri.go.jp/lbri/default.htm

National Strategy of Japan on Biodiversity 1995 at http://www.env.go.jp/en/pol/nsj/ and http://www.env.go.jp/en/pol/nsj/nsj-1s6.html

Jordan

First National Report at http://www.biodiv.org/doc/world/jo/jo-nr-01-en.pdf

Irani, K., Johnson, C. 1998. Making it pay: can community-based biodiversity conservation programmes be sustained through market-driven income generation schemes? Royal Society for the Conservation of nature, Amman, Jordan at http://srdis.ciesin.columbia.edu/cases/jordan-paper.html

Patrick. c.2003. *Using remote sensing and Indigenous knowledge for management of ephemeral water.* Aridlands Research Centre, Arizona State University at http://ag.arizona.edu/OALS/ALN/aln51/Patrick.html

Kuwait

Royal Court of Kuwait. 2003. *State of Kuwait* at http://demo.sakhr.com/diwan/emain/Story_Of_Kuwait/Oil_Era/Environment/environment.html

Centre for Research Kuwait at http://www.crsk.org/

Kuwait Institute for Scientific Research at http://www.kisr.edu.kw/

Lao People's Democratic Republic

Chape, S. 2002. Laos PDR. In J. Carew-Reid (Ed.) *Biodiversity Planning in Asia: A Review of National Biodiversity Strategies and Action Plans (NBSAPs),* IUCN at http://www.icem.com.au/bioplan/laos.pdf

IDRC Project 003492. *Management in Nam Ngum Watershed Lao PDR.* Phase 2 at http://network.idrc.ca

IDRC Project 040366. *Indigenous Fisheries Development and Management Lao PDR* Phase 2 at http://network.idrc.ca

IDRC Project 040436. Resource Tenure in Community-Based Natural Resource Management: Building Research Capacity Lao PDR at http://network.idrc.ca

IDRC Project 040450. *Small Scale Wetland Indigenous Fisheries Lao PDR* at http://network.idrc.ca

IDRC Project 900140. *Indigenous Fishery Development Lao PDR* at http://network.idrc.ca

IDRC Project 928004. *Upland Farming Systems Lao PDR* at http://network.idrc.ca

Lebanon

National Biodiversity Strategy and Action Plan for Lebanon 1998 at http://www.moe.gov.lb/biodiv/nat1.html

UNEP. 2003. Coastal Area Management Program (CAMP) at http://www.pap-thecoastcentre.org/camp-text-lebanon.html

WIPO. n/d. 'Access and Benefit-Sharing Agreement between the Lebanese Agricultural Research Institute, Tal Amara, Rayak, Lebanon and The Board of Trustees of the Royal Botanic Gardens, Kew, Richmond, Surrey, TW9 3AE United Kingdom', Traditional Knowledge and Cultural Expressions Contracts Database, http://www.wipo.int/globalissues/databases/contracts/summaries/larikew.html

Malaysia

8th Malaysia Plan: 2001-2005. Policy frameworks at http://www.bic.org.my/pdf/8MP_%20Policy_%20objectives.pdf

Bin Ozman, M. & Zakri, A.H. 2001. Malaysia's Approach to Access and Benefit Sharing in Glowka, L. Pisupati, B. & de Silva, S. 2001. (Eds.) *Access to Genetic Resources and Traditional Knowledge: Lessons from South and Southeast Asia*. Proceedings of the South and Southeast Asia Regional Workshop on Access to Genetic Resources and Traditional Knowledge at http://www.rbp-iucn.lk/books/abs/Chapter%207.pdf

Borneo Project at http://www.earthisland.org/borneo/

CBD Clearing House Mechanism at http://www.frim.gov.my/chm/database.htm

First National Report to the Convention on Biological Diversity 1998 at http://www.biodiv.org/world/map.asp?ctr=my

FRIM (Forest Research Institute Malayisa). [date?] *Research programmes 2001-2005* at http://www.frim.gov.my/priority.htm

Letchumanan, R. 2002. Malaysia. In J. Carew-Reid (Ed.) *Biodiversity Planning in Asia: A Review of National Biodiversity Strategies and Action Plans (NBSAPs),* IUCN at http://www.icem.com.au/bioplan/malaysia.pdf

Malaysia/MIT Biotechnology Partnership Program at http://minihelix.mit.edu/malaysia/programme/

National Biodiversity Policy at http://www.frim.gov.my/chm/policy.htm

Protection of Plant Varieties Act 1999 at http://www.grain.org/brl/region-asia-brl-en.cfm

Sarawak Biodiversity Centre at http://www.sbc.org.my

Myanmar

IDRC Project 040350. *Community Based Natural Resource Management* at http://network.idrc.ca

IDRC Project 928013. *Upland Farming Systems IRRI/Myanmar* Phase 2 at http://network.idrc.ca

Nepal

Craig, S. 1996. *Pasture management, indigenous veterinary care and the role of the horse in Mustang, Nepal.* Proceedings of a Regional Experts' Meeting, Rangelands and Pastoral Development in the Hundi Kush-Himalayas, November 5-7, at http://www.nepalnet.org.np/agriculture/icimod/pasture.htm

First National Report to the Convention on Biological Diversity at http://www.biodiv.org/doc/world/np/np-nr-01-en.pdf

IDRC Project 100361. *Catalyzing Change: Local Supply and Conservation Responses to Water Management* at http://network.idrc.ca

IDRC Project 911042. *Mountain Resource Management UBC/Nepal/ICIMOD* at http://network.idrc.ca

Lawoti, M. 2001. *Racial discrimination towards the Indigenous Peoples in Nepal.* Non-governmental report for the third conference against racism at http://www.mtnforum.org/resources/library/lkwom01a.htm

Manadhar, N. 1998. The preparation of *gundruck* in Nepal: a sustainable rural industry? *Indigenous Knowledge and Development Monitor* 6(3) at http://www.nuffic.nl/ciran/ikdm/6-3/mamamdh.html

National Biodiversity Strategy and Action Plan at http://www.biodiv.org/doc/world/np/np-nbsap-01-en.pdf

Pokharel, R.K. 1996. *Indigenous Technical Knowledge of people on Fodder Tree Management.* Nepal Net at http://www.panasia.org.sg/nepalnet/forestry/itk_paper.htm

Pokharel, R.K. Ramamajhi, S. 1993. *Chiuri: tree management through indigenous practices.* Nepal Net at http://www.panasia.org.sg/nepalnet/forestry/chiuri.htm

Parajuli, D.P., Pokhrel, S.K. 2002. Nepal. In J. Carew-Reid, (Ed.) *Biodiversity Planning in Asia: A Review of National Biodiversity Strategies and Action Plans (NBSAPs),* IUCN at http://www.rbp-iucn.lk/books/nNBSAP/nepal.pdf

Second National Report to the Convention on Biological Diversity at http://www.biodiv.org/doc/world/np/np-nr-02-en.pdf

Oman

Bin Tariq Al-Said, S.A. 2002. Statement of the Representative of His Majesty the Sultanate of Oman, World Summit on Sustainable Development, Johannesburg, South Africa, 3 September, at http://www.un.org/events/wssd/statements/omanE.htm

First National Report to the Convention on Biological Diversity 1997 at http://www.biodiv.org/world/map.asp?ctr=om

Ministry of Regional Municipalities and Environment and Water Resources at http://www.mrmewr.gov.om/nature.htm

Nizwa.NET. n.d. The Traditional Aflaj Irrigation System at http://www.nizwa.net/agr/falaj/index.html

Oman Portal. Arab Gateway. at http://www.al-bab.com/arab/countries/oman.htm

Pakistan

Aga Khan Rural Support Programme in Pakistan (AKRSP) at http://www.asa2000.anthropology.ac.uk/parkes/parkes.html

Anwar, M. & Shank, C. 2002. Pakistan in J. Carew-Reid (Ed.) *Biodiversity Planning in Asia: A Review of National Biodiversity Strategies and Action Plans (NBSAPs),* IUCN at http://www.rbp-iucn.lk/books/nNBSAP/pakistan.pdf

Atta-ur R.,M. Choudhary, M.I. n.d. *Bioprospecting of Medicinal and Food Plants: Pakistan, in Sharing Innovative Experiences,* Vol 7, UNDP/TCDC at http://www.ecdc.net.cn/events/innovative07/innov07_012.htm

Biodiversity Action Plan 1999 at http://www.macp-pk.org/bap.pdf

Bioprospecting of Medicinal and Food Plants: Pakistan at http://www.ecdc.net.cn/events/innovative07/innov07_012.htm

National Report of Pakistan for COP7 to the Ramsar Convention on Wetlands 1999 at http://www.ramsar.org/cop7_nr_pakistan.htm

WWF-Pakistan, Punjab Wildlife Department. 1994. *Community-Based Planning for Wetland Conservation: Lessons from the Ucchali Complex.* Report of the Participatory Rural Appraisal (PRA) Training Workshop Held In Ucchali Complex, Government Of Pakistan at http://www.iucn.org/themes/pmns/topics/wwfucchali.html

Papua New Guinea

Law, E. n.d. *Provincial Government reforms and the plight of the Motu Koitabu people.* UNESCO/CSI at http://www.unesco.org/csi/pub/papers2/png7.htm

Digim'Rina, L.S. *Requirements of an IK Centre.* Department of Anthropology and Sociology, University of Papua New Guinea at http://www.pngbuai.com/600technology/information/waigani/indigenous-centre/WS97-sec8-Linus.html

McDaniel, M. 1998. *Bio-patents: Indigenous person from PNG claimed in US government patent.* The Akha Heritage Foundation at http://thailine.com/akha/patent.htm

Promotion of indigenous wise practices: medicinal knowledge and freshwater fish, Moripi Cultural Area. UNESCO/CSI at http://www.unesco.org/csi/act/png2/summary15.htm

Sound development in the Motu-Koita Urban Villages, Port Moresby. UNESCO/CSI at http://www.unesco.org/csi/act/png/assess3.htm

Waigani Seminar at http://www.pngbuai.com/600technology/information/default.htm

People's Democratic Republic of Korea (North)

Developing and implementing National Biodiversity Strategies and Action Plans: Lessons Learnt from DPR of Korea at http://www.bpsp-neca.brim.ac.cn/calendars/workshop-1/11.html

Philippines

Blanco, J.L.B. 2000. *Harnessing TK for Development and Trade: The Bicol (Phils.) Experience.* UNCTAD Expert Meeting of Systems and National Experiences for Protecting Traditional Knowledge, Innovations and Practices, 2000 at http://r0.unctad.org/trade_env/docs/philippines.pdf

Corpuz, C. 1999. Case Study: Philippines – Mining in the Economy. In *The Gold Album: Action Pack*. Berkeley, USA: Project Underground at http://www.moles.org/ProjectUnderground/reports/goldpack/goldpack_h.html

Dutfield, G. 2000. *Developing and Implementing National Systems for Protecting TK: A Review of Experiences in Selected Developing Countries*. UNCTAD Expert Meeting of Systems and National Experiences for Protecting Traditional Knowledge, Innovations and Practices, 2000 at http://r0.unctad.org/trade_env/docs/dutfield.pdf

IDRC-SUB. 2002. *Understanding and Improving Marine Protected Areas, Philippines.* Sustainable Use of Biodiversity Programme Initiative Project No 100607 at http://network.idrc.ca/ev.php?URL_ID=4960&URL_DO=DO_TOPIC&URL_SECTION=201&reload=1056852078

Macrohon, J.S. n.d. *Biopirates – 5: Manila Shows How to Protect Biodiversity.* Philippine Journal Group at http://simbahayan.tripod.com/B%-biopiracy05.html

Meniado, A., Garcia, J.L., Madamba, E.J. 2002. Philippines. In J. Carew-Reid (Ed.) *Biodiversity Planning in Asia: A Review of National Biodiversity Strategies and Action Plans (NBSAPs),* IUCN at http://www.icem.com.au/bioplan/philippines.pdf

National Biodiversity Strategy and Action Plan 1997 at http://www.psdn.org.ph/nbsap/main.html

Overcoming labour shortages through indigenous mutual-help groups at http://www.unesco.org/most/bpik20.htm

Philippines Marine Protected Areas Project at http://network.idrc.ca/ev.php?URL_ID=4960&URL_DO=DO_TOPIC&URL_SECTION=201&reload=1052363892

Project Seahorse at http://www.seahorse.mcgill.ca

Peria, E.V. 2002. *The Way We Were, As We Are Now: Access & Benefit-Sharing in the Philippines* at http://www.ictsd.org/dlogue/2002-04-19/Peria.pdf

Raghavan, C. 2000. *Philippines Government Clamps Down On Biopirates.* Third World Network at http://www.twnside.org.sg/title/clamps.htm

Sweet Potato Research- the importance of local knowledge in conserving crop diversity. SciDevNet at http://www.scidev.net/dossiers/indigenous_knowledge/ikpolicy_campilan.html

UNESCO, 2002. An ecological assessment of Ulugan Bay, Palawan, Philippines. *CSI Info* N° 12, at http://www.unesco.org/csi/pub/info/ulu.htm

Republic of Korea (South)

Clearing House Mechanism for Convention on Biological Diversity at http://www.me.go.kr/english/html3/20000009/20000009.htm

Developing and Implementing National Biodiversity Strategy: Lessons from the Republic of Korea at http://www.bpsp-neca.brim.ac.cn/calendars/workshop-1/12.html

First National Report to the Convention on Biological Diversity at http://www.biodiv.org/doc/world/kr/kr-nr-01-en.pdf

National Biodiversity Strategy and Action Plan at http://www.biodiv.org/doc/world/kr/kr-nbsap-01-en.pdf

Second National Report to the Convention on Biological Diversity at http://www.biodiv.org/doc/world/kr/kr-nr-02-en.pdf

Thematic Report on Alien and Invasive Species to the Convention on Biological Diversity at http://www.biodiv.org/doc/world/kr/kr-nr-ais-en.pdf

Thematic Report on Forest Ecosystems to the Convention on Biological Diversity at http://www.biodiv.org/doc/world/kr/kr-nr-fe-en.pdf

United Nations. 1997. *Institutional Aspects of Sustainable Development in the Republic of Korea* at http://www.un.org/esa/agenda21/natlinfo/countr/repkorea/inst.htm

Saudi Arabia

Global Development Network. 2003. *Research, Policy and Implementation Linkages in Biodiversity Management in Saudi Arabia* http://www.gdnet.org/subpages/RAPNet/Case_Studies/Case_Study_19_Full.html

National Biodiversity Strategy and Action Plan 2001 at http://www.biodiv.org/world/map.asp?ctr=sa

Saudi Arabia's System Plan for Protected Areas at http://www.gdnet.org/subpages/RAPNet/Case_Studies/Case_Study_19_Full.html

Singapore

First National Report to the Convention on Biological Diversity at http://www.biodiv.org/doc/world/sg/sg-nr-01-en.pdf

Koh Kheng, L. 2002. Singapore. In J. Carew-Reid (Ed.) *Biodiversity Planning in Asia: A Review of National Biodiversity Strategies and Action Plans (NBSAPs),* IUCN at http://www.rbp-iucn.lk/books/nbsap/singa.pdf

Second National report to the Convention on Biological Diversity at http://www.biodiv.org/doc/world/sg/sg-nr-02-en.pdf

Thematic Report on Access and Benefit Sharing to the Convention on Biological Diversity at http://www.biodiv.org/doc/world/sg/sg-nr-abs-en.pdf

Thematic Report on Alien and Invasive Species to the Convention on Biological Diversity at http://www.biodiv.org/doc/world/sg/sg-nr-ais-en.pdf

Thematic Report on Forest Ecosystems to the Convention on Biological Diversity at http://www.biodiv.org/doc/world/sg/sg-nr-fe-en.pdf

Thematic Report on Mountain Ecosystems to the Convention on Biological Diversity at http://www.biodiv.org/doc/world/sg/sg-nr-me-en.pdf

Sri Lanka

ESCAP Virtual Conference at http://www.unescap.org/drpad/vc/conference/ex_lk_57_wmc.htm

First National report to the Convention on Biological Diversity at http://www.biodiv.org/doc/world/lk/lk-nr-01-en.pdf

IDRC Project 938310. *Watershed Management Sri Lanka* at http://network.idrc.ca

Mahindapala, R. 2002. Sri Lanka. In J. Carew-Reid (Ed.) *Biodiversity Planning in Asia: A Review of National Biodiversity Strategies and Action Plans (NBSAPs),* IUCN at http://www.icem.com.au/bioplan/sri_lanka.pdf

Ranasinghe, H. 1995. Traditional tree-crop practices in Sri Lanka *Indigenous Knowledge and Development Monitor* 3(3) at http://www.nuffic.nl/ciran/ikdm/3-3/articles/ranasinghe.html

Second National report to the Convention on Biological Diversity at http://www.biodiv.org/doc/world/lk/lk-nr-02-en.pdf

Thematic Report on Alien and Invasive Species to the Convention on Biological Diversity at http://www.biodiv.org/doc/world/lk/lk-nr-ais-en.pdf

Ulluwishewa, R. 1994. Women's indigenous knowledge of water management in Sri Lanka Indigenous Knowledge and Development Monitor 2(3) at http://www.nuffic.nl/ciran/ikdm/2-3/articles/ulluwishewa.html

UNESCO. n.d. *The Bethma Practice: promoting the temporary redistribution of lands during drought periods* at http://www.unesco.org/most/bpik21.htm

Wanniyala -Aetto Indigenous people of Sri Lanka: A Plan to Protect Bio-diversity and Indigenous Culture in Sri Lanka at http://www.global-vision.org/srilanka/

Syrian Arabic Republic

Biodiversity Strategy and Action Plan for the Syrian Arab Republic at http://www.biodiv.org/world/map.asp?lg=0&ctr=sy

First National Report for the Convention on Biological Diversity 1997 http://www.biodiv.org/world/map.asp?lg=0&ctr=sy

International Fund for Agricultural Development. 2002. *Idleb rural Development Project.* Approved Project (1233) for Syria at http://www.ifad.org/operations/projects/regions/PN/des/SY.htm

International Plant Genetic Resources Institute (IGPRI) at http://www.ipgri.cgiar.org/system/page.asp?theme=2

Second National Report for the Convention on Biological Diversity 2002 http://www.biodiv.org/world/map.asp?lg=0&ctr=sy

Wessels, J., Hoogeveen, R. 2002. Renovation of Qanats in Syria at http://www.unu.edu/env/land/wessels.pdf

Thailand

Akha Heritage Foundation at http://thailine.com/akha/index.htm

A place for indigenous people in protected areas, Surin islands, Andaman Sea, Thailand. UNESCO/CSI at http://www.unesco.org/csi/act/thailand/assess7.htm

Cavallo, D. 2000. Emergent design and learning environments: Building on indigenous knowledge. *Indigenous Knowledge and Development Monitor* 39(3/4) at http://www.research.ibm.com/journal/sj/393/part2/cavallo.html

First National report to the Convention on Biological Diversity at http://www.biodiv.org/doc/world/tn/tn-nr-01-en.pdf

IDRC Project 100108. *Shifting Cultivation and Health Conditions in Thailand* at http://network.idrc.ca

IDRC Project 910231. *Participatory Extension Thailand* at http://network.idrc.ca

Kater, A. [date] Indigenous learning in crafts: a pilot research effort' *Indigenous Knowledge and Development Monitor* 1(1) at http://www.nuffic.nl/ciran/ikdm/1-1/kater.html

Moreno-Black, G. Somnasang, P. Thamthawan, S. 1994. Women in Northeastern Thailand: preservers of botanical diversity' *Indigenous Knowledge and Development Monitor* 2(3) at http://www.nuffic.nl/ciran/ikdm/2-3/articles/moreno.html

Puginier, O. 2001. *Can participatory land use planning at community level in the highlands of northern Thailand use GIS as a communication tool?* at http://www.iapad.org/participatory_landuse_planning_in_northern_thailand.htm

Review of Developments Pertaining to the Promotion and Protection of Human Rights and Fundamental Freedoms of Indigenous Populations, including Economic and Social Relations between Indigenous Peoples and States in Thailand at http://www.cwis.org/fwdp/Eurasia/thailand.txt

Second National report to the Convention on Biological Diversity at http://www.biodiv.org/doc/world/tn/tn-nr-02-en.pdf

Thematic Report on Alien and Invasive Species the Convention on Biological Diversity at http://www.biodiv.org/doc/world/tn/tn-nr-ais-en.pdf

Thematic Report on Mountain Ecosystems the Convention on Biological Diversity at http://www.biodiv.org/doc/world/tn/tn-nr-me-en.pdf

Treaty of Amity and Economic Relations between the Kingdom of Thailand and the United States of America at http://www.thailawforum.com/database1/amity.html

UNESCO/CSI. 2000. *Thailand's sea nomads.* UNESCO/CSI at http://www.unesco.org/csi/act/thailand/moken_e.htm

UNESCO. 2003. A place for indigenous people in protected areas, Surin Islands, Andaman Sea, Thailand. Environment and development
in coastal regions and in small islands at http://www.unesco.org/csi/act/thailand/surin.htm

Vivajsirin, S. Eawpanich, P. Mittelman, A. 2002. Thailand. In J. Carew-Reid (Ed.) *Biodiversity Planning in Asia: A Review of National Biodiversity Strategies and Action Plans (NBSAPs),* IUCN at http://www.rbp-iucn.lk/books/nNBSAP/thiland.pdf

United Arab Emirates

Emirates Centre for Strategic Studies and Research. n.d. *The Land and its People* at http://www.ecssr.ac.ae/Land/medicine.html

Ministry of Information and Culture in the UAE at http://www.uaeinteract.com/default.asp

Viet Nam

First National report to the Convention on Biological Diversity at http://www.biodiv.org/doc/world/vn/vn-nr-01-en.pdf

IDRC Project 003009. *Viet Nam Economic and Environmental Management (VEEM)* at http://network.idrc.ca

IDRC Project 004562. *Enhancing Capacity to Engender Research for Sustainable Development Viet Nam* at http://network.idrc.ca

IDRC Project 040020. *Community-Based Upland Resource Management Viet* Nam at http://network.idrc.ca

IDRC Project 040326. *Natural Resources Management Network Viet Nam* at http://network.idrc.ca

IDRC Project 040384. *Le Defi Forestier au Viet Nam 2* at http://network.idrc.ca

IDRC Project 040405. *Community-Based Upland Resource Management (HCM)* Phase 2 at http://network.idrc.ca

IDRC Project 040407. *Natural resource Management: Hong Ha Commune Viet* Nam Phase 2 at http://network.idrc.ca

IDRC Project 100876. *Community-Based Upland Natural Resources Management Viet Nam* Phase 3 at http://network.idrc.ca

IDRC Project 101019. *Isang Bagsak – A program in participatory development communication* at http://network.idrc.ca

IDRC Project 101413. *Community-based coastal resource management (CBCRM) in Central Viet Nam* at http://network.idrc.ca

IDRC Project 101442. *Community Capacity Building for Attacking Rural Poverty* at http://network.idrc.ca

Law and Policy Frameworks and Main Government Programs at http://www.adb.org/Documents/Reports/Indigenous_Peoples/VIE/chapter_3.pdf

Rahman, A. 2002. *Mekong Aqua Base Project* at http://www.fes.uwaterloo.ca/u/marahman/Mekong_AquaBase.htm

Second National report to the Convention on Biological Diversity at http://www.biodiv.org/doc/world/vn/vn-nr-02-en.pdf

The Ethnic Minority Development Data System (EMDDS) http://www.unesco.org/most/bpik23.htm

Thematic Report on Alien and Invasive Species to the Convention on Biological Diversity at http://www.biodiv.org/doc/world/vn/vn-nr-ais-en.pdf

Warne, S., Lein Phong, T. 2002. Vietnam. In J. Carew-Reid (Ed.) *Biodiversity Planning in Asia: A Review of National Biodiversity Strategies and Action Plans (NBSAPs),* IUCN at http://www.icem.com.au/bioplan/vietnam.pdf

Yemen

Ba-Angood, S. 2000. Some Ancient Practices Used for Agricultural Pest Control in Yemen. Conference Paper of Problems and Perspectives, Sanaa, Yemen, June 18-20 at http://www.aiys.org/webdate/pelbaa.html

Brunner, U. 2000. *The Place of Ancient Agricultural Practices And Techniques In Yemen Today.* Conference Paper of Problems and Perspectives, Sanaa, Yemen, June 18-20 at http://www.aiys.org/webdate/pelbru.html

National Biodiversity Strategy and Action Plan at http://www.biodiv.org/doc/world/ye/ye-nbsap-01-en.pdf

UNDP. 2003. Sustainable Environmental Management Programme (YEM/97/100) at http://www.undp.org.ye/env1.htm

Yemen: Women's Indigenous Technical Knowledge on Sheep Operations at http://www.ifad.org/gender/learning/sector/agriculture/w_y.htm

4.3 Questionnaire respondents

Faronda, A. Philippine Council for Agriculture Forestry and National Resources Research and Development- Department of Science and Technology (PCARRD-DOST), PHILIPPINES.

Ferrari, M.F. Forest Peoples Programme, UNITED KINGDOM.

Mohammadi Fazel, A. Natural History Museums & NNBSAP National Project Manager, Ministry of Foreign Affairs, IRAN .

Panahi, M. National Consultant for NBSAP, Department of Environment, UNDP/GEF/NNBSAP Secretariat, IRAN.

Shah, N.C. Centre for Indigenous Knowledge of Indian Herbal Resources (CIKIHR), INDIA.

Singh, R. Department Of Extension Education and Rural Sociology, College Of Horticulture and Forestry, Central Agricultural University, Pasighat, Arunachal Pradesh, INDIA.

Sundar, S. Research Institute of Science, Science Technology and Environment Agency, LAOS PDR.
